



48/50HJ004-007 Single Package Rooftop Gas Heating/Electric Cooling and Electric Cooling Units 50/60 Hz



Wiring Diagrams

NOTE: This literature applies to units manufactured on or after April 3, 1995.

INDEX

UNIT	UNIT VOLTAGE-PHASE	TYPE	NUMBER	FIG. NO.
48HJ004-006	208/230-1-60	Schematic/Component Arrangement	50HJ501027	1
	208/230-3-60	Schematic/Component Arrangement	50HJ501028	2
	460-3-60	Schematic/Component Arrangement	50HJ501029	3
	575-3-60	Schematic/Component Arrangement	50HJ501030	4
48HJ007	208/230-3-60	Schematic/Component Arrangement	50HJ501031	5
	460-3-60	Schematic/Component Arrangement	50HJ501032	6
	575-3-60	Schematic/Component Arrangement	50HJ501033	7
50HJ004-006	208/230-1-60	Schematic/Component Arrangement	50HJ501034	8
50HJ004,005	208/230-3-60	Schematic/Component Arrangement	50HJ501035	9
	460-3-60	Schematic/Component Arrangement	50HJ501036	10
	575-3-60	Schematic/Component Arrangement	50HJ501037	11
50HJ006	208/230-3-60	Schematic/Component Arrangement	50HJ501024	12
	460-3-60	Schematic/Component Arrangement	50HJ501025	13
	575-3-60	Schematic/Component Arrangement	50HJ501026	14
50HJ007	208/230-3-60	Schematic/Component Arrangement	50HJ501038	15
	460-3-60	Schematic/Component Arrangement	50HJ501038	15
	575-3-60	Schematic/Component Arrangement	50HJ501039	16
50HJ006,007	400-3-50	Schematic/Component Arrangement	50HJ501040	17

Electric Heat

UNIT SIZE	ELECTRIC HEATER		LABEL	FIG. NO.
	V-Ph	kW		
50HJ004-006	208/240-1	All	3-05531	18
50HJ004-007	208/240-3	All		
50HJ004-007	480-3	All	3-05532	19

Accessories

UNIT	COMPONENT	FIG. NO.
48/50HJ004-007	Motormaster® Device	20
	Time Guard® II Control	21
	Remote Control Panel	22
	Accusensor™ II Enthalpy Control	23
	Accusensor III Enthalpy Control	24
	Enthalpy Control and Varislide™ Economizer Control Board	25
	PARABLADE Economizer	26
	Carrier TEMP System Thermostat and Apollo Communicating Control	27
	Apollo Communicating Control	28

OPERATING SEQUENCE

48HJ Units

COOLING UNITS WITHOUT ECONOMIZER — When thermostat calls for cooling, terminals G and Y1 and the compressor contactor (C) are energized. The indoor (evaporator) fan motor (IFM), compressor, and outdoor (condenser) fan motor (OFM) start. The OFM runs continuously while the unit is in cooling. When the thermostat is satisfied, C is deenergized and the compressor and OFM shut off. After a 30-second delay, the IFM shuts off. If the thermostat fan selector switch is in the ON position, the evaporator motor will run continuously.

COOLING, UNITS WITH VARISLIDE™ ECONOMIZER — When the outdoor-air temperature is above the outdoor air thermostat (OAT) setting and the room thermostat calls for cooling, the compressor contactor is energized to start the compressor and outdoor (condenser) fan motor (OFM). The indoor (evaporator) fan motor (IFM) is energized and the economizer damper moves to the minimum position. After the thermostat is satisfied, the damper moves to the fully closed position when IFM is deenergized.

When the outdoor-air temperature is below the OAT setting and the thermostat calls for Y1 and G, the economizer damper moves to the minimum position when the evaporator fan starts. The first stage of cooling is provided by the economizer. If the supply-air temperature is above 57 F (14 C), a switch on the supply-air thermostat is closed between the T2 terminal and the 24 vac terminal. This causes the damper to continue to modulate open until the supply-air temperature falls below 55 F (13 C) or the damper reaches the fully open position.

When the supply-air temperature is between 55 F and 52 F (13 C and 11 C), the supply-air thermostat has open switches between the T2 and 24 vac terminals and between the T1 and 24 vac terminals. This causes the economizer damper to remain in an intermediate open position.

If the supply-air temperature falls below 52 F (11 C), a switch on the supply-air thermostat is closed between the T1 terminal and the 24 vac terminal. This causes the damper to modulate closed until the supply-air temperature rises above 55 F (13 C) or the damper reaches the minimum position.

When the supply-air temperature is between 55 F and 57 F (13 C and 14 C), the supply-air thermostat has open switches between the T2 and 24 vac terminals. This causes the economizer damper to remain in an intermediate open position.

If the outdoor air alone cannot satisfy the cooling requirements of the conditioned space, economizer cooling is integrated with mechanical cooling, providing second-stage cooling. The compressor and condenser fan will be energized and the position of the economizer damper will be determined by the supply-air temperature.

When the second stage of cooling is satisfied, the compressor and OFM will be deenergized. The damper position will be determined by the supply-air temperature.

When the first stage of cooling is satisfied, the IFM shuts off after a 30-second delay. The damper then moves to fully closed position.

COOLING, UNITS WITH PARABLADE ECONOMIZER — When the outdoor air is above the enthalpy control setting, and the room thermostat calls for cooling, the compressor contactor is energized to start the compressor and the outdoor (condenser) fan motor (OFM). The indoor (evaporator) fan motor (IFM) is energized and the economizer damper moves to the minimum position. After the room thermostat is satisfied, the damper will spring-return to the fully closed position.

When the outdoor air is below the enthalpy control setting and the thermostat calls for cooling, the economizer outdoor air damper is opened proportionally to maintain between 50 F and 56 F (10 C and 13 C) at the mixed air sensor. If outside air alone cannot satisfy the cooling requirements, economizer cooling is integrated with mechanical cooling. When the room thermostat is satisfied, the damper will spring-return to the fully closed position.

HEATING, UNITS WITHOUT ECONOMIZER — When the thermostat calls for heating, terminal W1 is energized. The induced-draft motor is energized and the burner ignition sequence begins. The IFM is energized 45 seconds after a flame is ignited. On units equipped for two stages of heat, when additional heat is needed, W2 is energized and the high-fire solenoid on the main gas valve (MGV) is energized. When the thermostat is satisfied and W1 is deenergized, the IFM stops after a 45-second time-off delay.

HEATING, UNITS WITH ECONOMIZER/TWO-POSITION DAMPER — When the thermostat calls for heating, terminal W1 is energized. The induced-draft motor is energized and the burner ignition sequence begins. The IFM is energized 45 seconds after a flame is ignited and the damper moves to the minimum position. If the two-position damper is used, the outdoor-air damper opens to the minimum position whenever the evaporator fan runs. On units equipped for two stages of heat, when additional heat is needed, W2 is energized and the high-fire solenoid on the main gas valve (MGV) is energized. When the thermostat is satisfied and W1 is deenergized, the IFM stops after a 45-second time-off delay. The economizer damper then moves to the fully closed position. When using continuous fan, the damper will remain in the minimum position.

50HJ Units

COOLING, UNITS WITHOUT ECONOMIZER — When the thermostat calls for cooling, terminals G and Y1 are energized. The indoor (evaporator) fan contactor (IFC), and compressor contactor no. 1 (C1) are energized and the indoor (evaporator) fan motor (IFM), compressor no. 1, and condenser fan start. The outdoor (condenser) fan motor (OFM) runs continuously while unit is cooling.

COOLING UNITS WITH VARISLIDE™ ECONOMIZER — When the outdoor-air temperature is above the outdoor air thermostat (OAT) setting and the room thermostat calls for cooling, the compressor contactor is energized to start the compressor and outdoor (condenser) fan motor (OFM). The indoor (evaporator) fan motor (IFM) is energized and the economizer damper moves to the minimum position. After the thermostat is satisfied, the damper moves to the fully closed position when IFM is deenergized.

When the outdoor-air temperature is below the OAT setting and the thermostat calls for Y1 and G (cooling), the economizer damper moves to the minimum position when the evaporator fan starts. The first stage of cooling is provided by the economizer. If the supply-air temperature is above 57 F (14 C), a switch on the supply-air thermostat is closed between the T2 terminal and the 24 vac terminal. This causes the damper to continue to modulate open until the supply-air temperature falls below 55 F (13 C) or the damper reaches the fully open position.

When the supply-air temperature is between 55 F and 52 F (13 C and 11 C), the supply-air thermostat has open switches between the T2 and 24 vac terminals and between the T1 and 24 vac terminals. This causes the economizer damper to remain in an intermediate open position.

If the supply-air temperature falls below 52 F (11 C), a switch on the supply-air thermostat is closed between the T1 terminal and the 24 vac terminal. This causes the damper to modulate closed until the supply-air temperature rises above 55 F (13 C) or the damper reaches the minimum position.

When the supply-air temperature is between 55 F and 57 F (13 C and 14 C), the supply-air thermostat has open switches between the T2 and 24 vac terminals. This causes the economizer damper to remain in an intermediate open position.

If the outdoor air alone cannot satisfy the cooling requirements of the conditioned space, economizer cooling is integrated with mechanical cooling, providing second-stage cooling. The compressor and condenser fan will be energized and the position of the economizer damper will be determined by the supply-air temperature.

When the second stage of cooling is satisfied, the compressor and OFM will be deenergized. The damper position will be determined by the supply-air temperature.

When the first stage of cooling is satisfied, there is a 30-second delay before the indoor (evaporator) fan shuts off on 004-006 units. The damper will move to fully closed position.

COOLING, UNITS WITH PARABLADE ECONOMIZER — When the outdoor air is above the enthalpy control setting, and the room thermostat calls for cooling, the compressor contactor is energized to start the compressor and the outdoor (condenser) fan motor (OFM). The indoor (evaporator) fan motor (IFM) is energized and the economizer damper moves to the minimum position. After the room thermostat is satisfied, the damper will spring return to the fully closed position.

When the outdoor air is below the enthalpy control setting and the thermostat calls for cooling, the economizer outdoor air damper is opened proportionally to maintain between 50 F and 56 F (10 C and 13 C) at the mixed air sensor. If outside air alone cannot satisfy the cooling requirements, economizer cooling is integrated with mechanical cooling. When the room thermostat is satisfied, the damper will spring return to the fully closed position.

HEATING, UNITS WITHOUT ECONOMIZER — Upon a call for heating through W1, IFC and heater contactor no. 1 (HC1) are energized. On units equipped for 2 stages of heat, when additional heat is needed, heater contactor no. 2 is energized through W2.

HEATING, UNITS WITH ECONOMIZER/TWO POSITION DAMPER — When the room temperature calls for heat through terminal W1, the IFC and heater contactor no. 1 are energized. On units equipped for 2 stages of heat, when additional heat is needed, heater contactor no. 2 is energized through W2. The economizer damper moves to the minimum position. If the two-position damper is used, the outdoor-air damper opens to the minimum position whenever the evaporator fan runs. When the thermostat is satisfied, the damper moves to the fully closed position.

LEGEND FOR FIG. 1-17

AHA — Adjustable Heat Anticipator
APS — Air Pressure Switch
AWG — American Wire Gage
BR — Blower Relay
C — Contactor, Compressor
CAP — Capacitor
CB — Circuit Breaker
CC — Cooling Compensator
CLO — Compressor Lockout
COM — Common
COMP — Compressor Motor
CR — Control Relay
D — Diode
EC — Enthalpy Control
ECON — Economizer (Varislide™)
EPS — Emergency Power Supply (9-V Battery)
EQUIP — Equipment
ER — Economizer Relay
FPT — Freeze-Protection Thermostat
FSS — Filter Status Switch
FU — Fuse
GND — Ground
GVR — Gas Valve Relay
HC — Heater Contactor
HPS — High-Pressure Switch
HS — Hall Effect Sensor
HV TRAN — High-Voltage Transformer

I — Ignitor
IDM — Induced Draft Motor
IFC — Indoor (Evaporator) Fan Contactor
IFM — Indoor (Evaporator) Fan Motor
IGC — Integrated Gas Unit Controller
LED — Light-Emitting Diode
LPS — Low-Pressure Switch (Loss of Charge)
LS — Limit Switch
LSM — Limit Switch (Manual Reset)
MGV — Main Gas Valve
MTR — Motor
OAT — Outdoor-Air Thermostat
OFC — Outdoor (Condenser) Fan Contactor
OFM — Outdoor (Condenser) Fan Motor
P — Plug
PL — Plug Assembly
QT — Quadruple Terminal
R — Relay
RS — Rollout Switch
SAT — Supply-Air Thermostat
SEN — Sensor
SW1 — Switch Fully Open
SW2 — Switch Fully Closed
SW3 — Switch Minimum Vent Position
SW4 — Switch Maximum Vent Position
TB — Terminal Block
TC — Thermostat-Cooling

TDR — Time-Delay Relay
TH — Thermostat-Heating
TRAN — Transformer
 Field Splice
 Marked Wire
 Terminal (Marked)
 Terminal (Unmarked)
 Terminal Block
 Splice
 Factory Wiring
 Field Control Wiring
 Field Power Wiring
 Accessory or Optional Wiring
 To indicate common potential only, not to represent wiring.

NOTES FOR FIG. 1-17

NOTES FOR FIG. 1

1. If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
2. Thermostat:
HH07AT170, 172
Subbase:
HH93AZ176, 177, 178 and 179
3. Set heat anticipator at .14 amp for first stage and .14 amp for second stage.
4. Use copper conductors only.
5. TRAN is wired for 230 v unit. If unit is to be run with 208 v power supply, disconnect BLK wire from 230 v tap (ORN) and connect to 208 v tap (RED). Insulate end of 230 v tap.

NOTES FOR FIG. 2-7

1. If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
2. Three-phase motors are protected under primary single-phasing conditions.
3. Thermostat:
HH07AT170, 172
Subbase:
HH93AZ176, 177, 178 and 179
4. Set heat anticipator at .14 amp for first stage and .14 amp for second stage.
5. Use copper conductors only.
6. TRAN is wired for 230 v unit. If unit is to be run with 208 v power supply, disconnect BLK wire from 230 v tap (ORN) and connect to 208 v tap (RED). Insulate end of 230 v tap.

NOTES FOR FIG. 8

1. If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
2. Thermostat:
HH07AT170, 172
Subbase:
HH93AZ176, 177, 178 and 179
3. Set heat anticipator at .8 amp for first stage and .3 amp for second stage.
4. Use copper conductors only.

5. TRAN is wired for 230 v unit. If unit is to be run with 208 v power supply, disconnect BLK wire from 230 v tap (ORN) and connect to 208 v tap (RED). Insulate end of 230 v tap.
6. Use copper, copper-clad aluminum, or aluminum conductors.

NOTES FOR FIG. 9, 12, AND 15

1. If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
2. Three-phase motors are protected under primary single-phasing conditions.
3. Thermostat:
HH07AT170, 172
Subbase:
HH93AZ176, 177, 178 and 179
4. Set heat anticipator at .8 amp for first stage and .3 amp for second stage.
5. Use copper conductors only.
6. TRAN is wired for 230 v unit. If unit is to be run with 208 v power supply, disconnect BLK wire from 230 v tap (ORN) and connect to 208 v tap (RED). Insulate end of 230 v tap.
7. Use copper, copper-clad aluminum, or aluminum conductors.

NOTES FOR FIG. 10, 11, 13, 14, 16, AND 17

1. If any of the original wire furnished must be replaced, it must be replaced with type 90 C wire or its equivalent.
2. Three-phase motors are protected under primary single-phasing conditions.
3. Thermostat:
HH07AT170, 172
Subbase:
HH93AZ176, 177, 178 and 179
4. Set heat anticipator at .8 amp for first stage and .3 amp for second stage.
5. Use copper conductors only.
6. Use copper, copper-clad aluminum, or aluminum conductors.

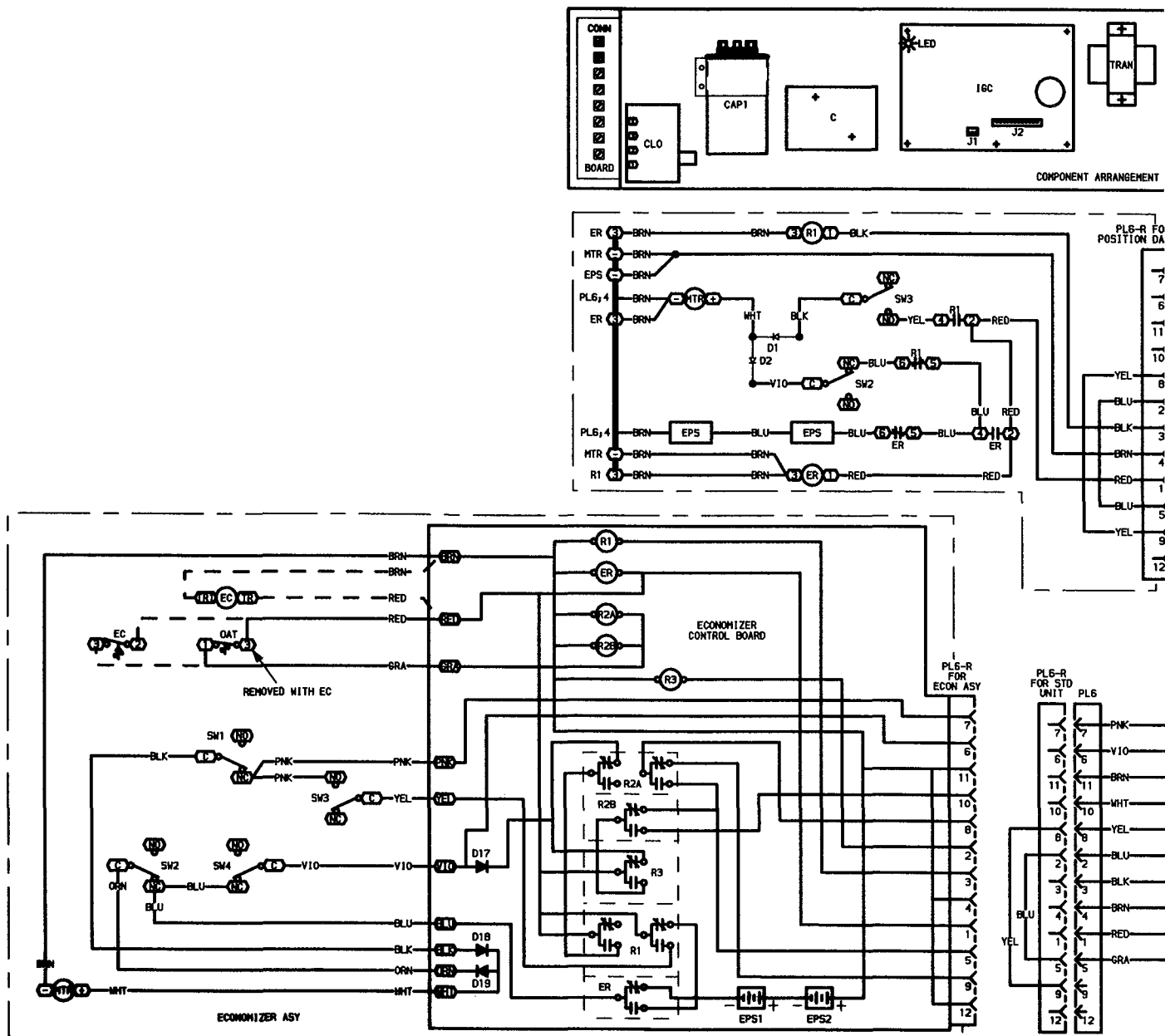
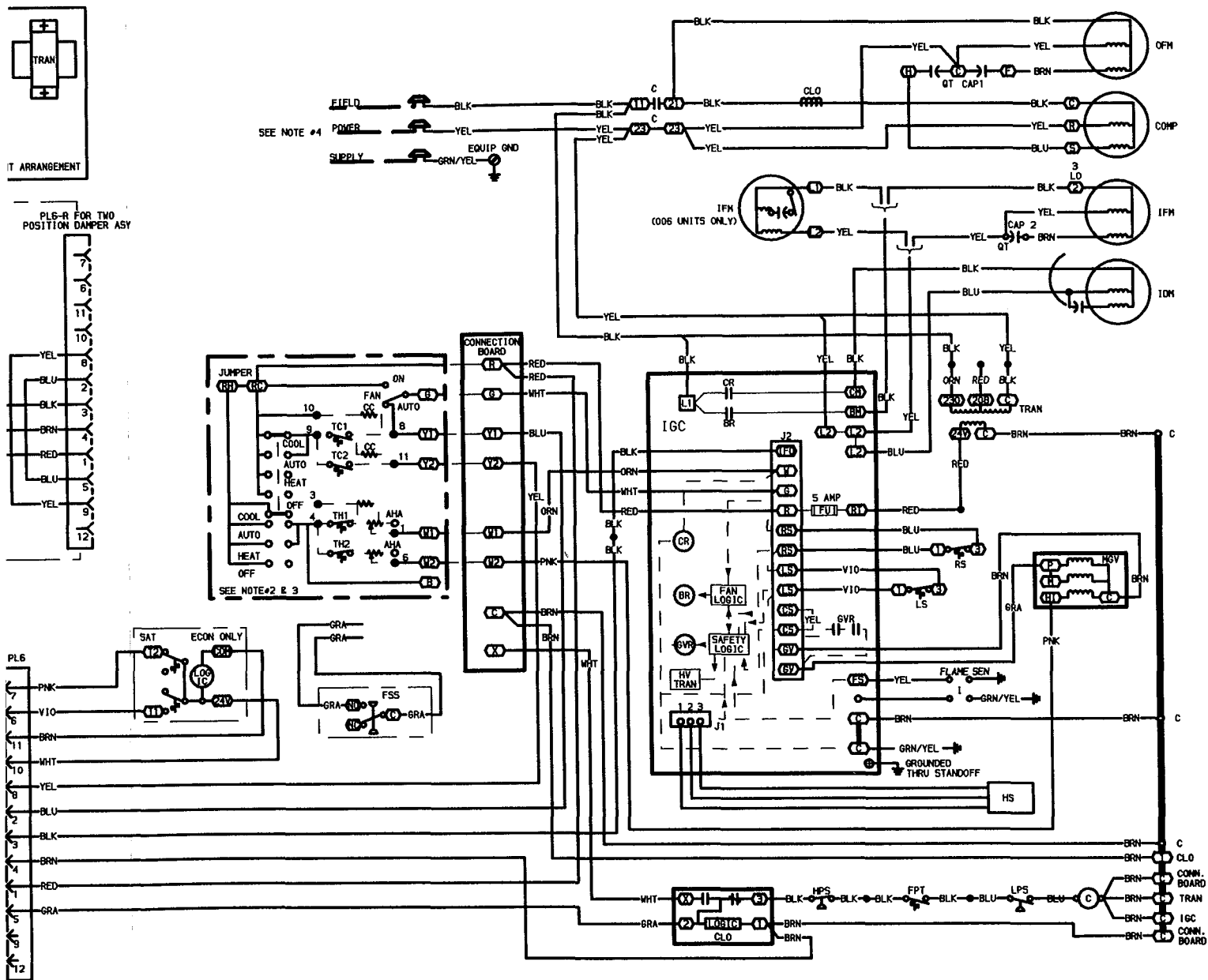


Fig. 1 – Label Diagram, Schematic and Compo



d Component Arrangement; 48HJ004-006; 208/230-1-60

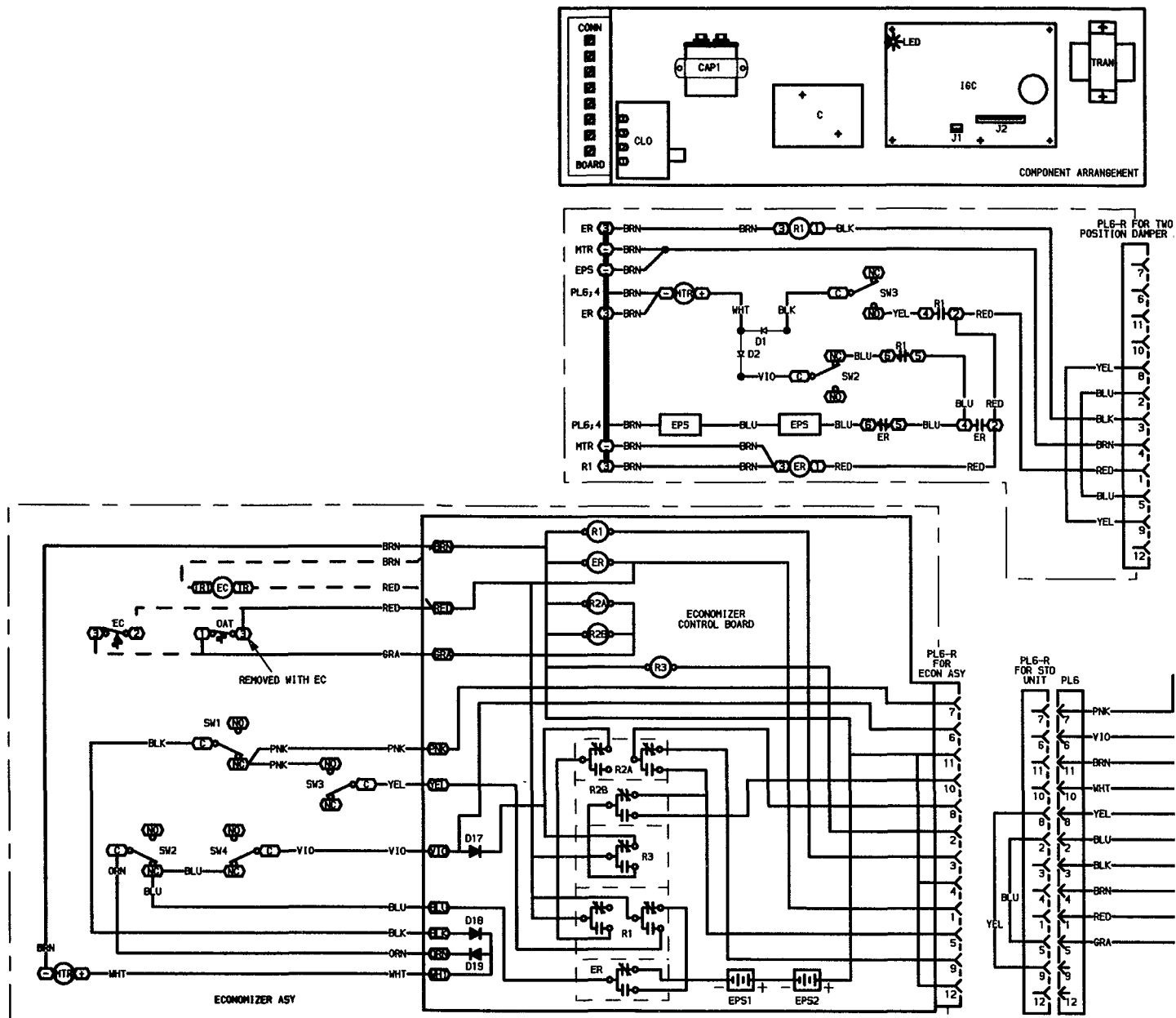


Fig. 2 — Label Diagram, Schematic and Component Arrangement

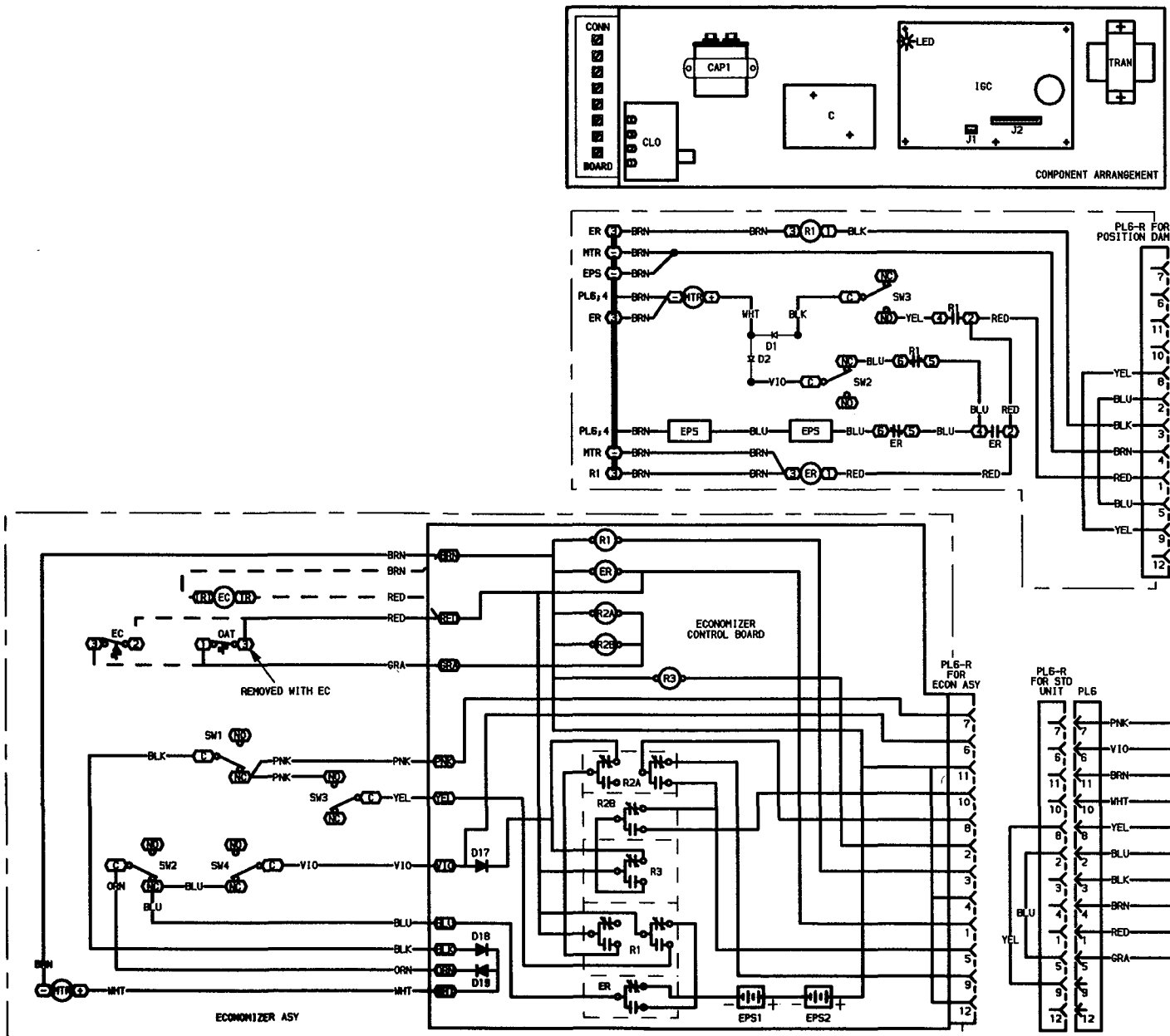
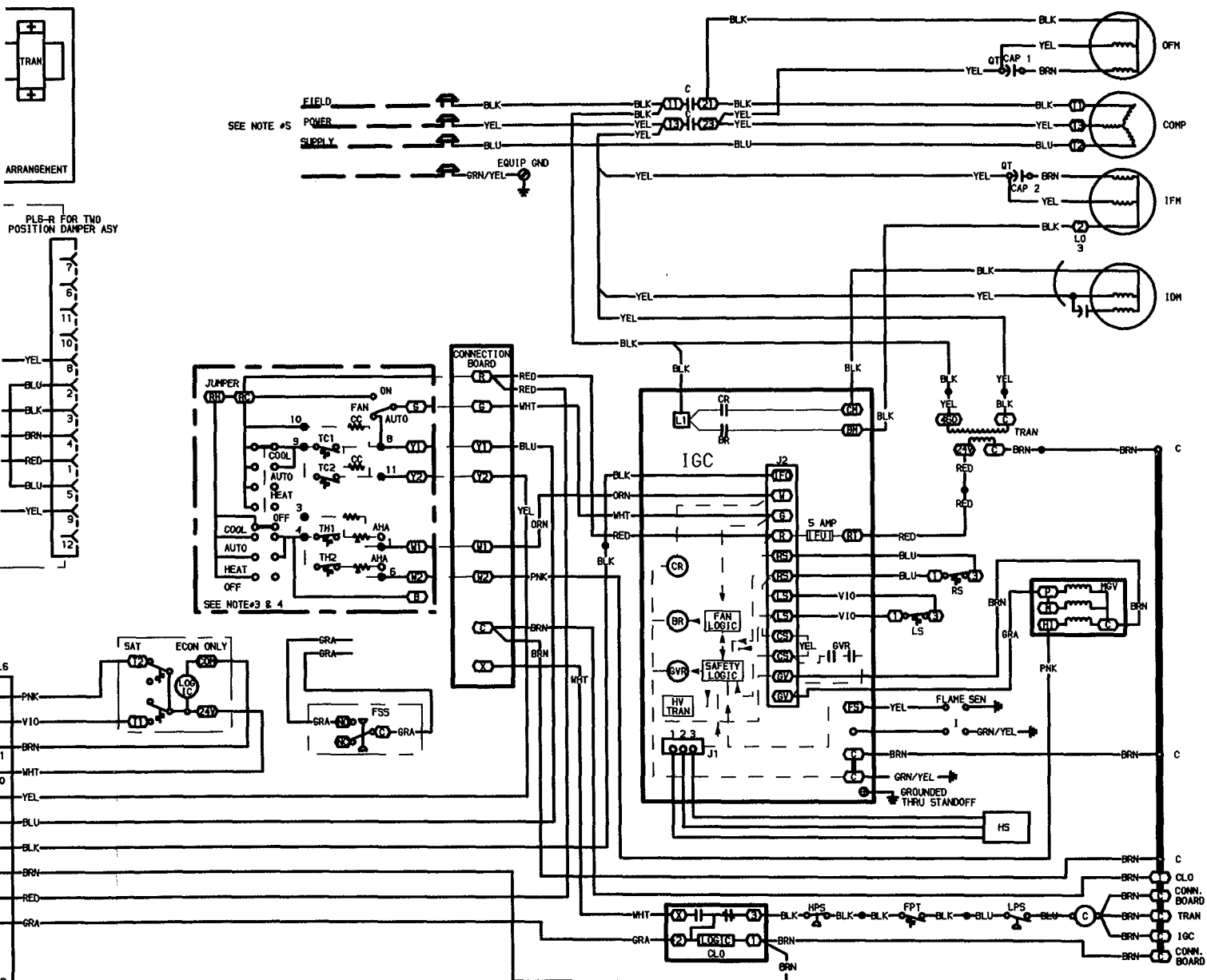


Fig. 3 – Label Diagram; Schematic and Com



End Component Arrangement; 48HJ004-006; 460-3-60

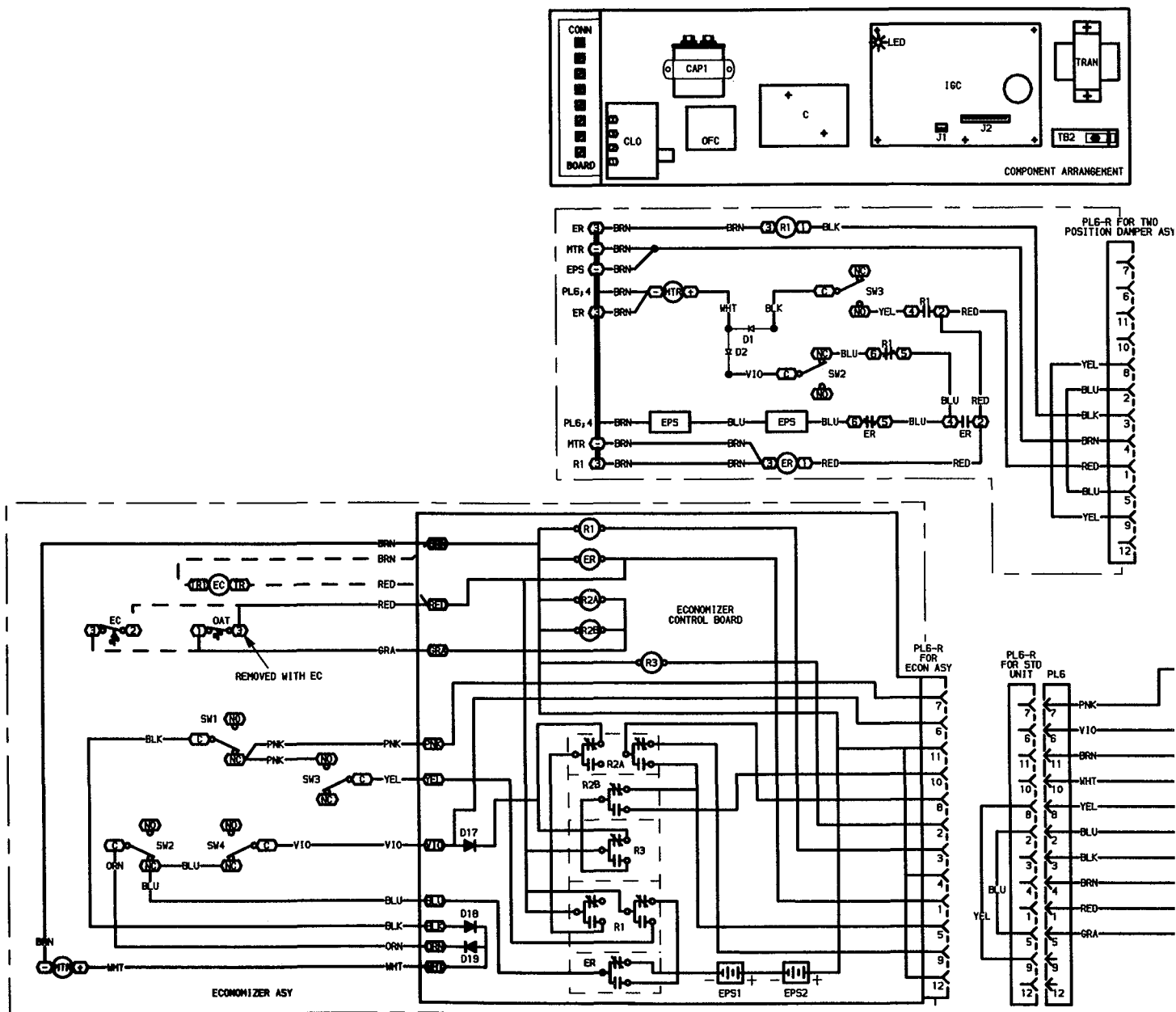
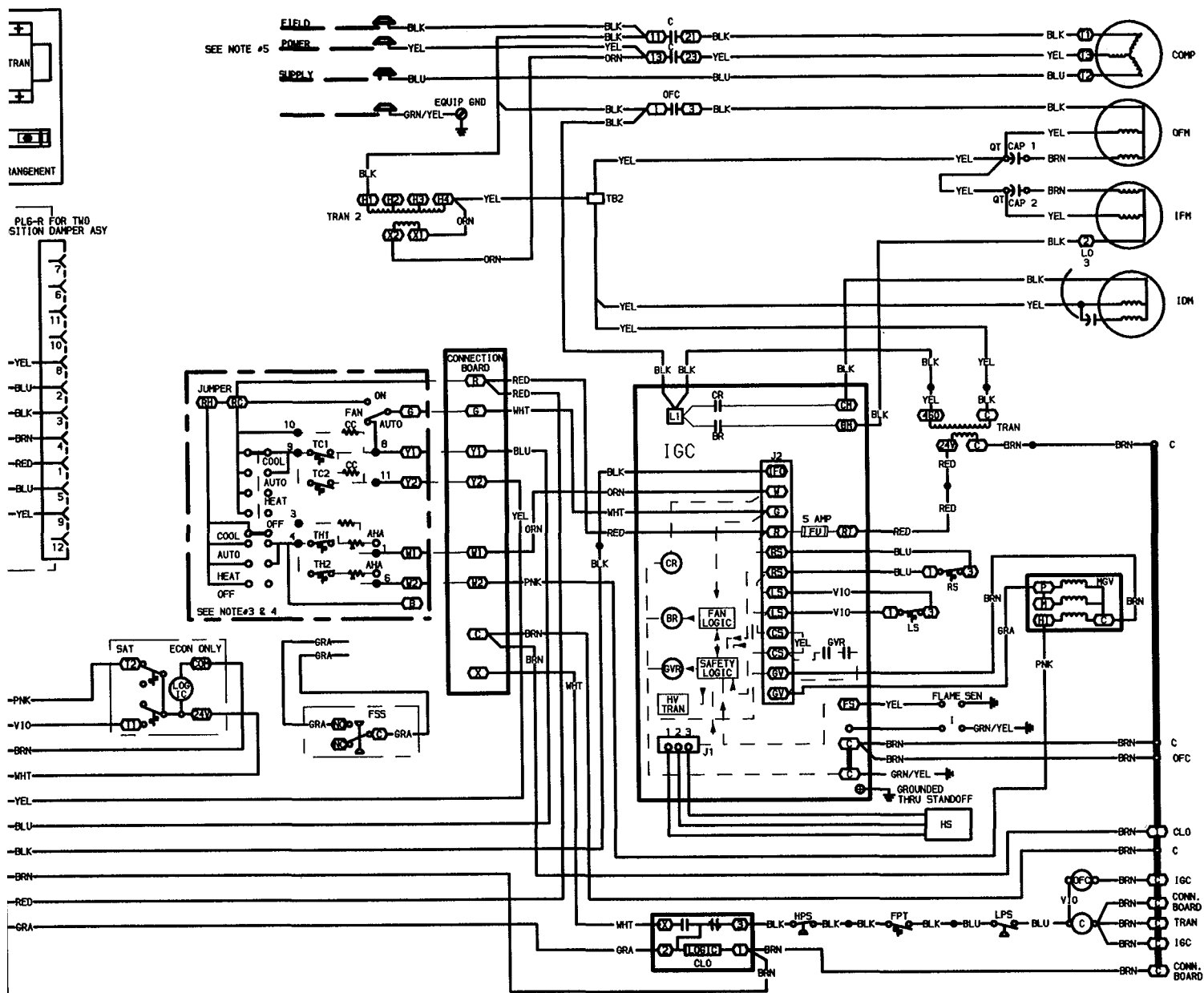
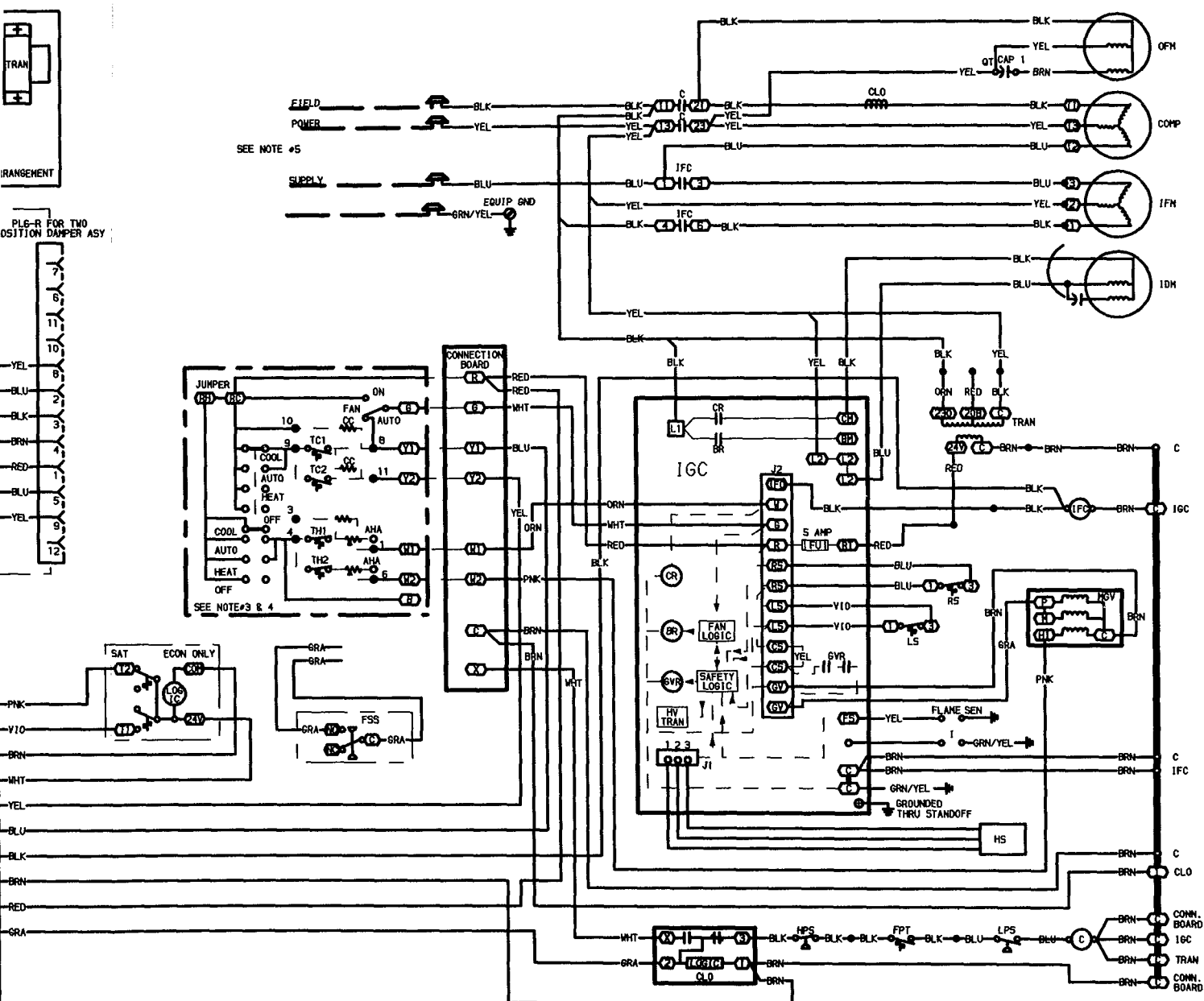


Fig. 4 – Label Diagram; Schematic and Component



Component Arrangement; 48HJ004-006; 575-3-60



and Component Arrangement; 48HJ007; 208/230-3-60



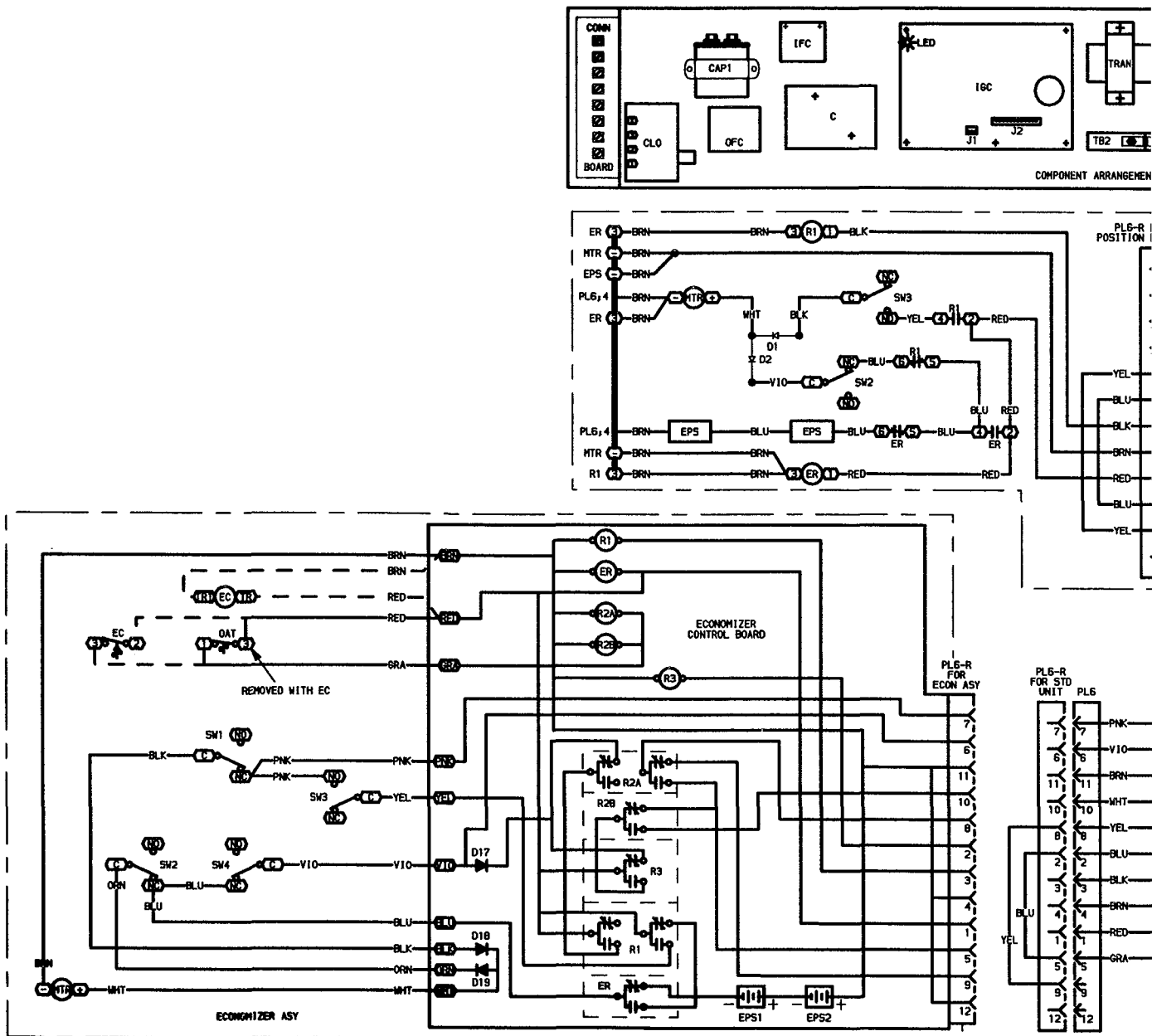


Fig. 7 – Label Diagram, Schematic and Component Arrangement

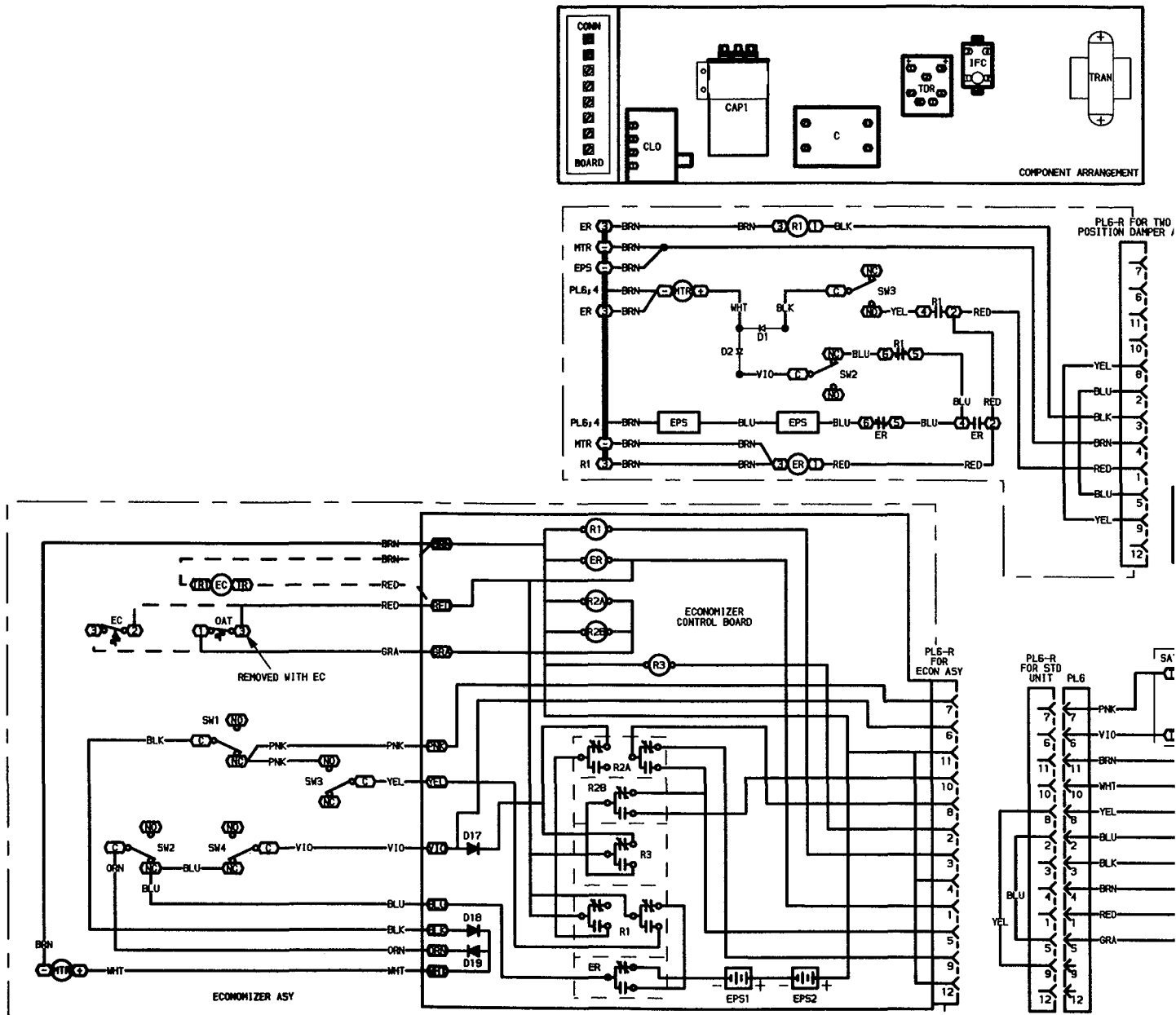
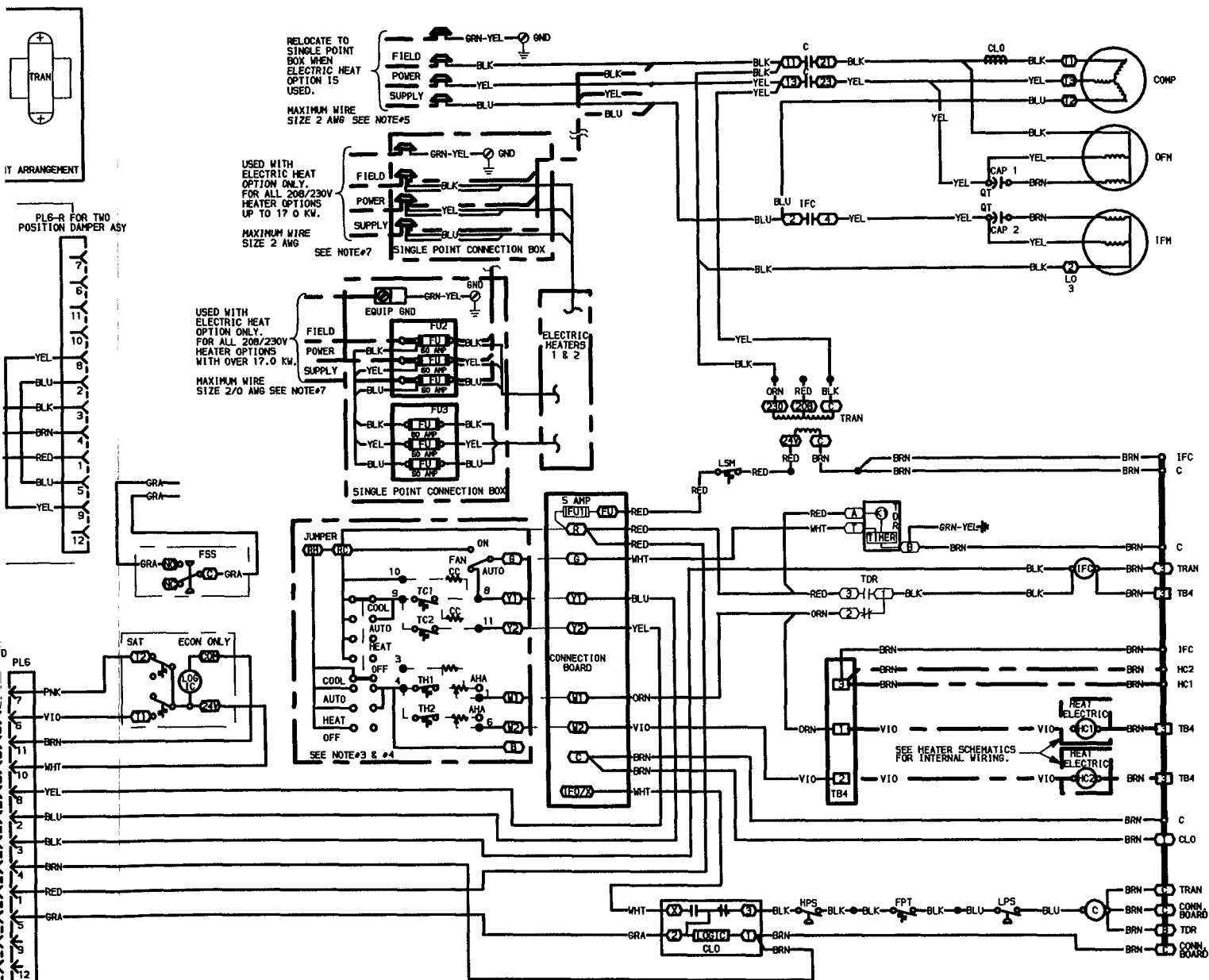
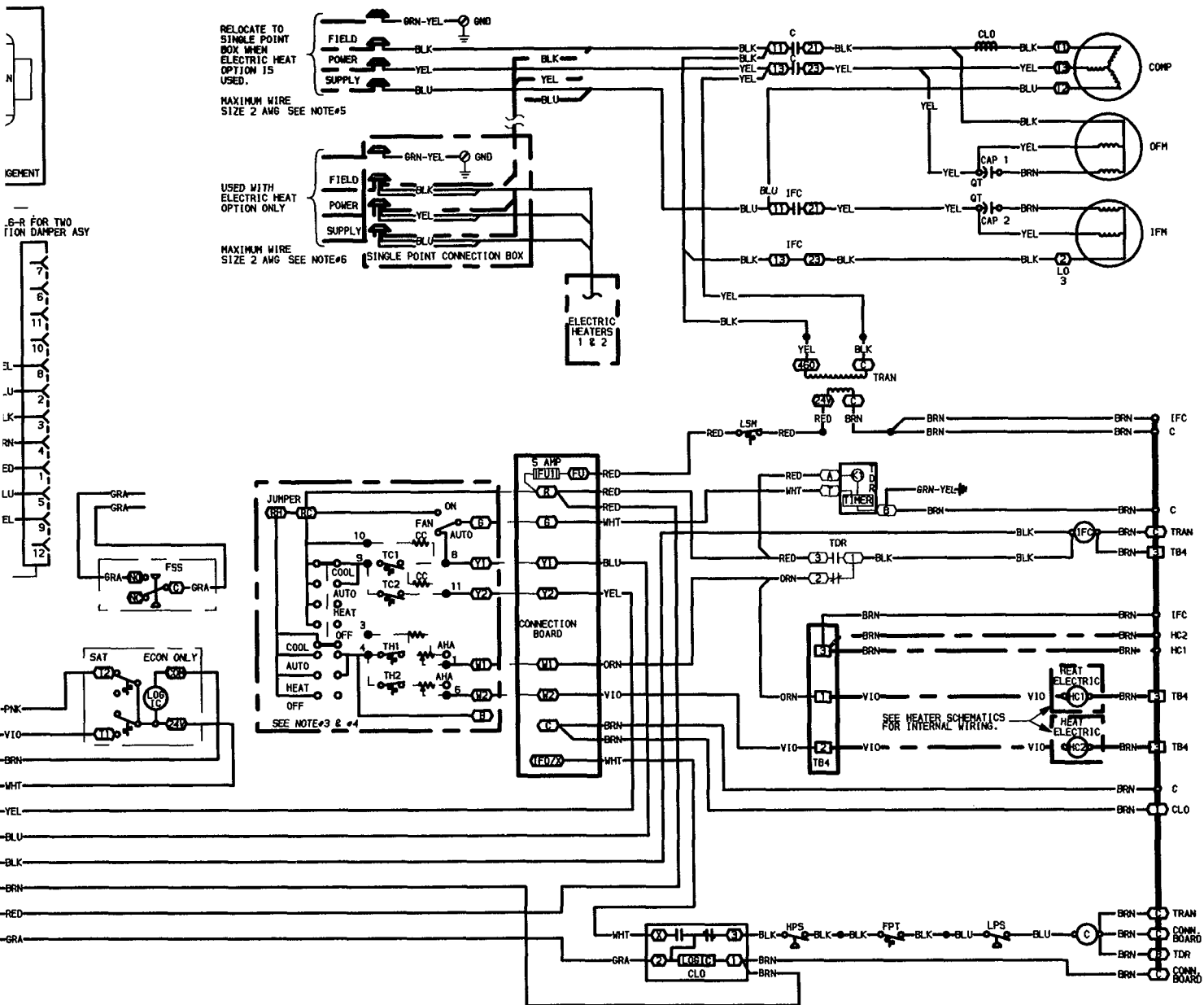


Fig. 8 – Label Diagram, Schematic and Compone



Component Arrangement; 50HJ004,005; 208/230-3-60

Fig. 10 – Label Diagram, Schematic and Component



Component Arrangement; 50HJ004,005; 460-3-60

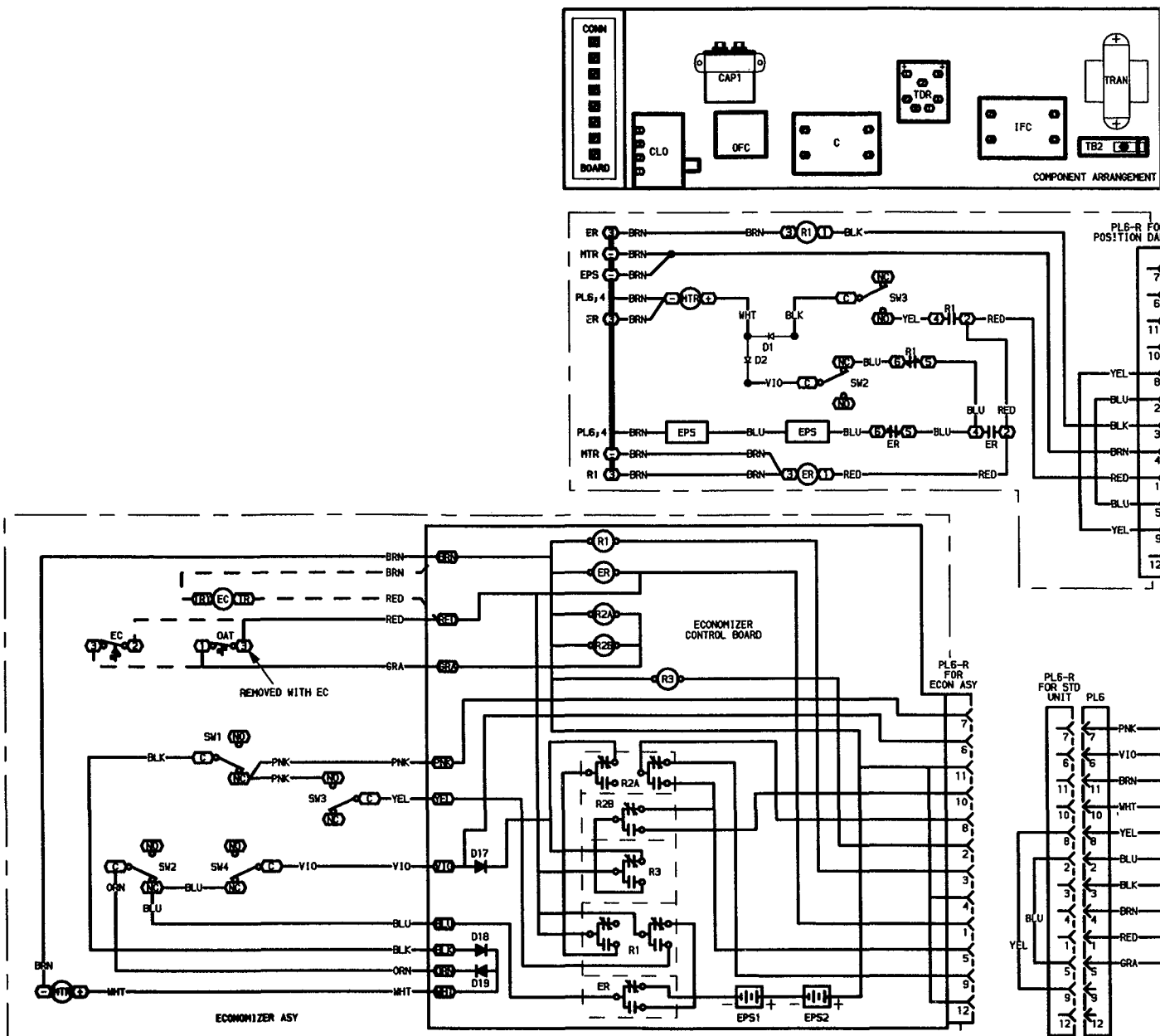
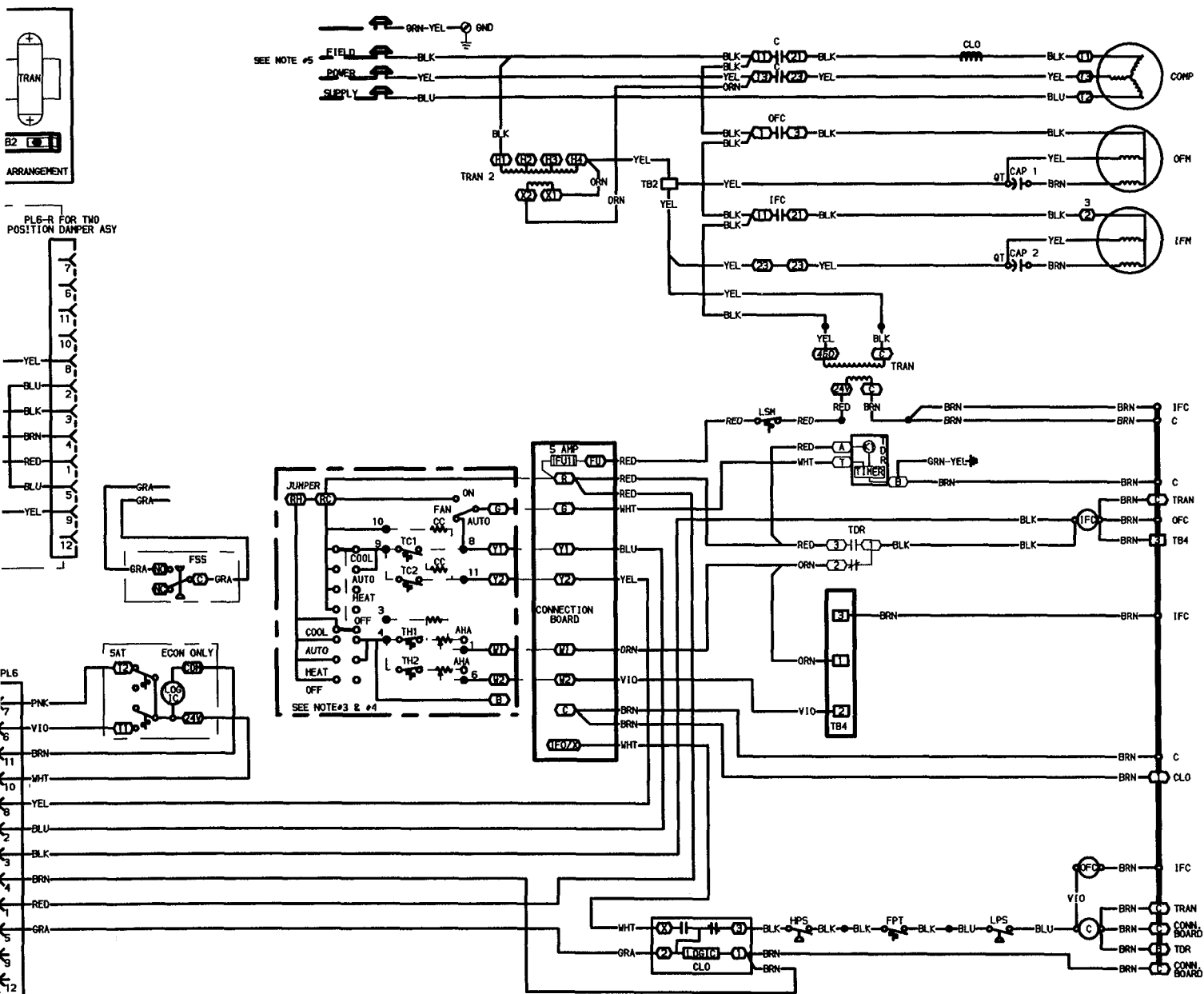


Fig. 11 – Label Diagram, Schematic and Cor



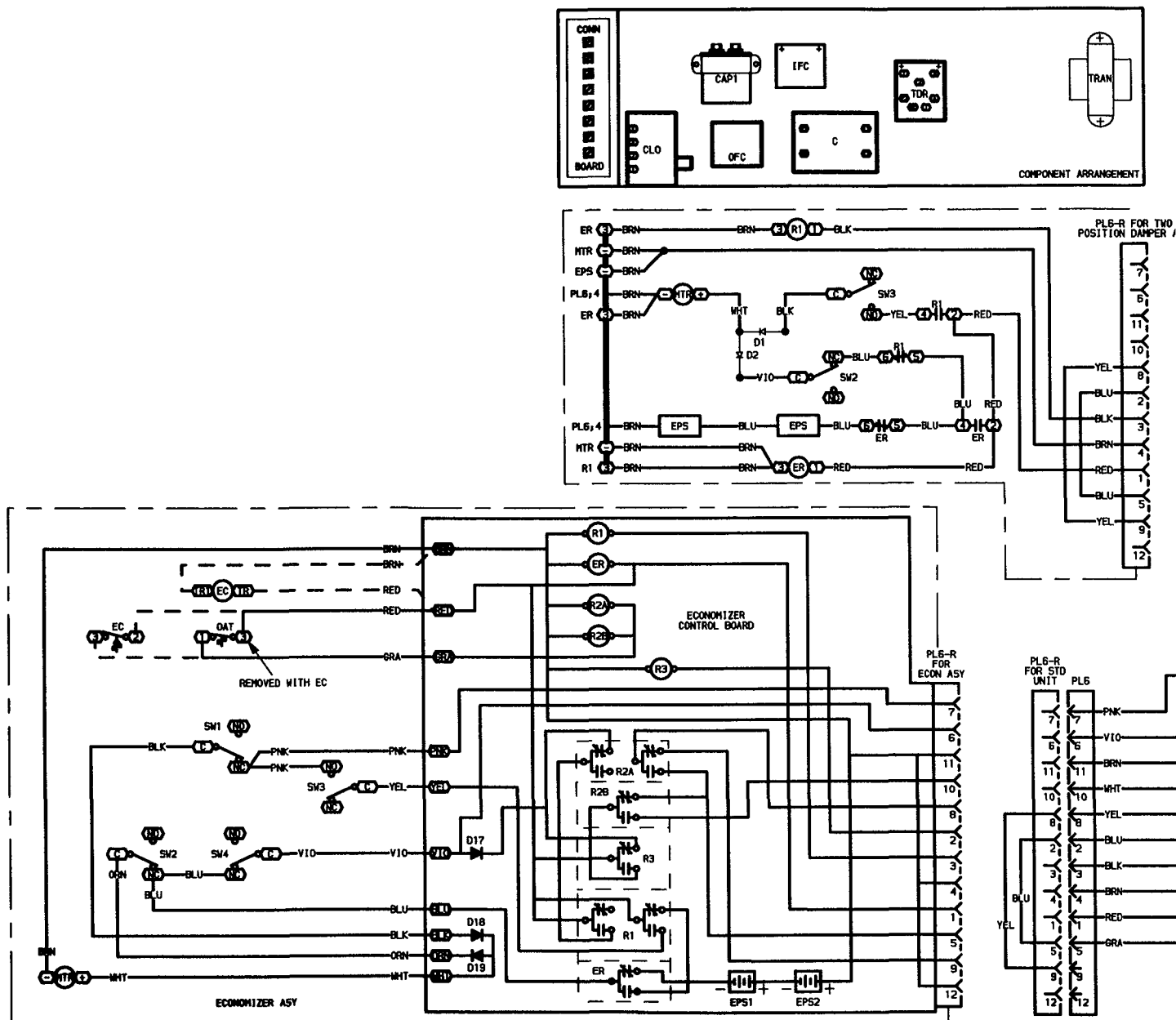


Fig. 12 – Label Diagram, Schematic and Component Arrangement



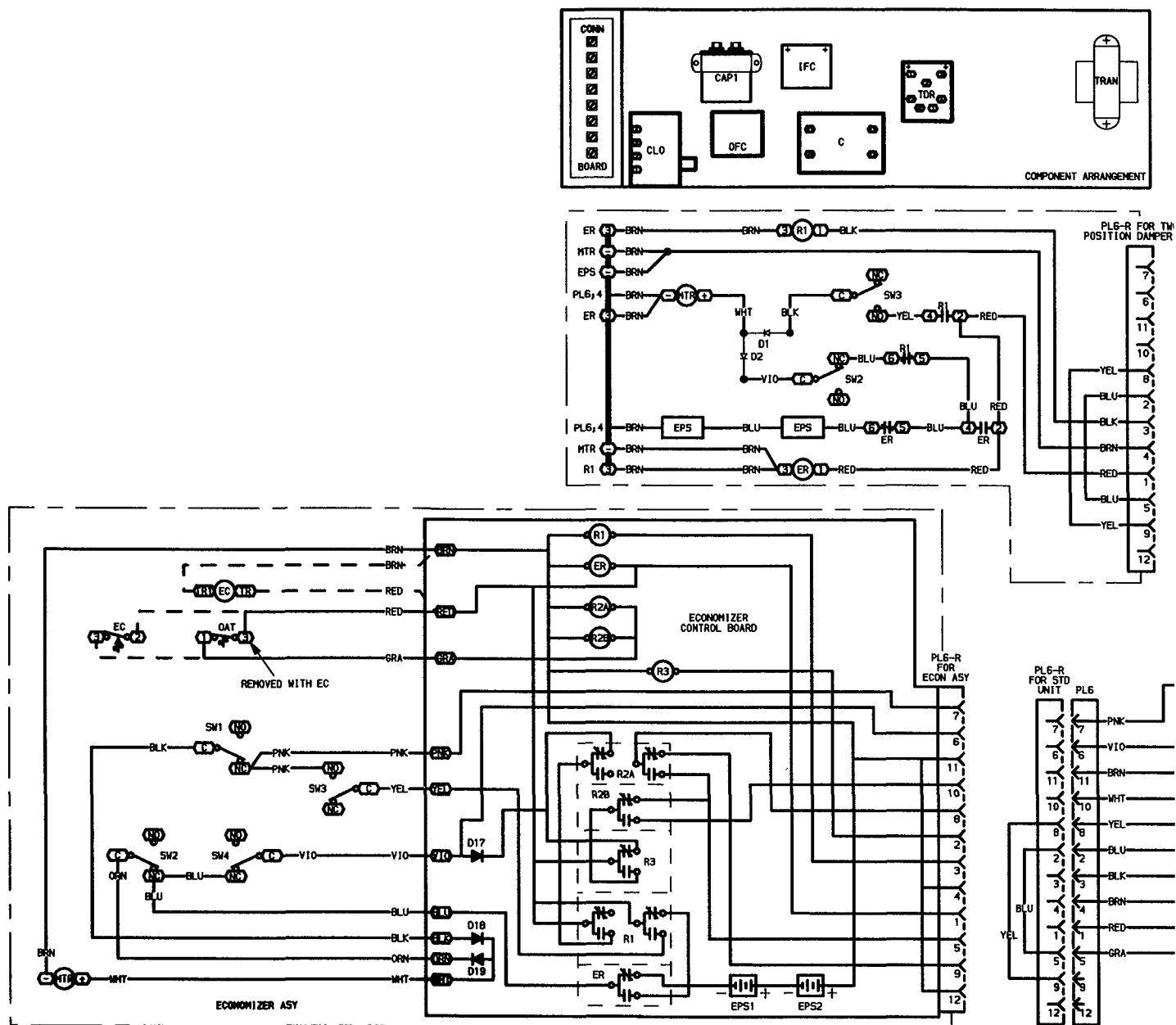
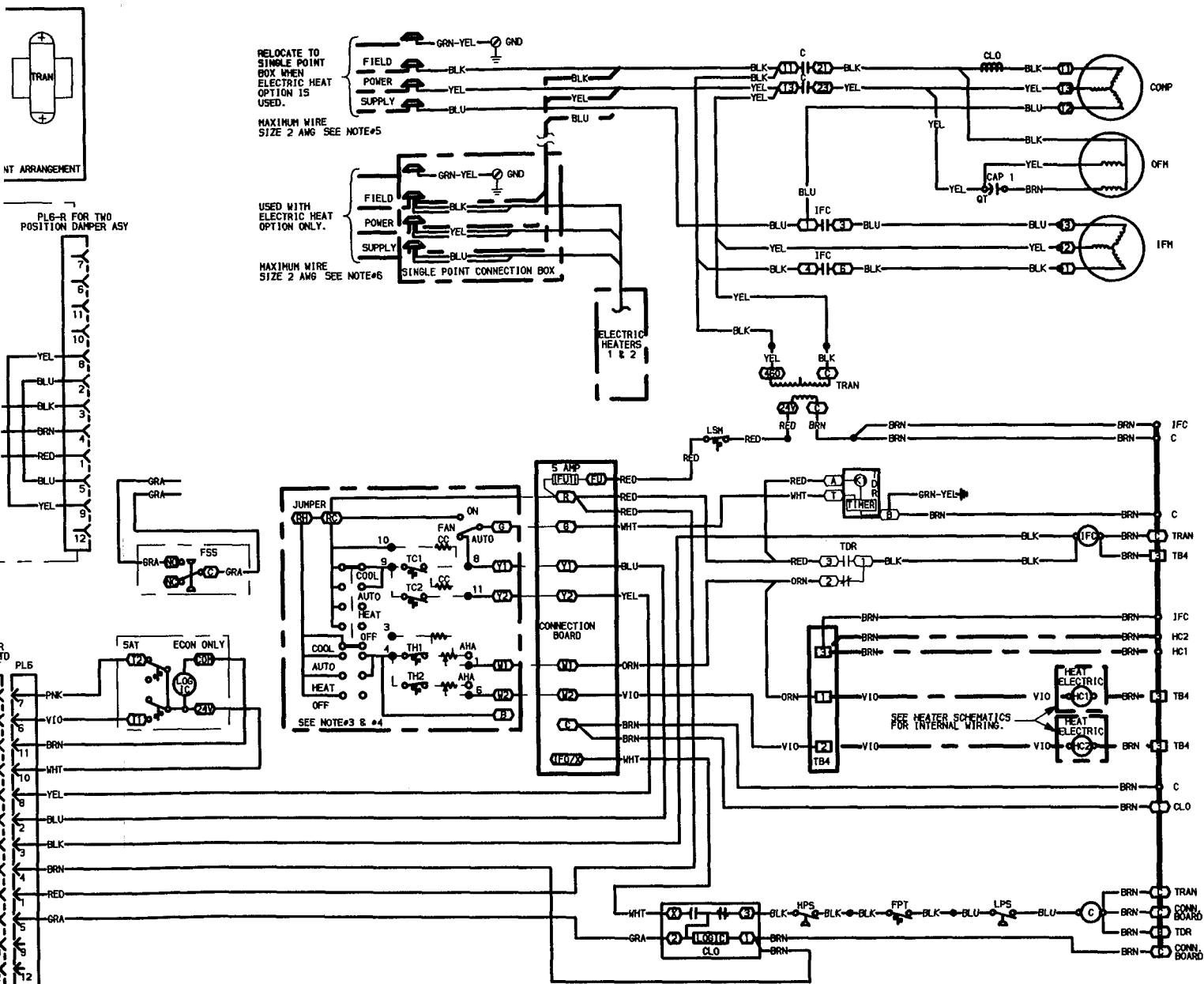


Fig. 13 - Label Diagram, Schematic and Con



Mechanical and Component Arrangement; 50HJ006; 460-3-60

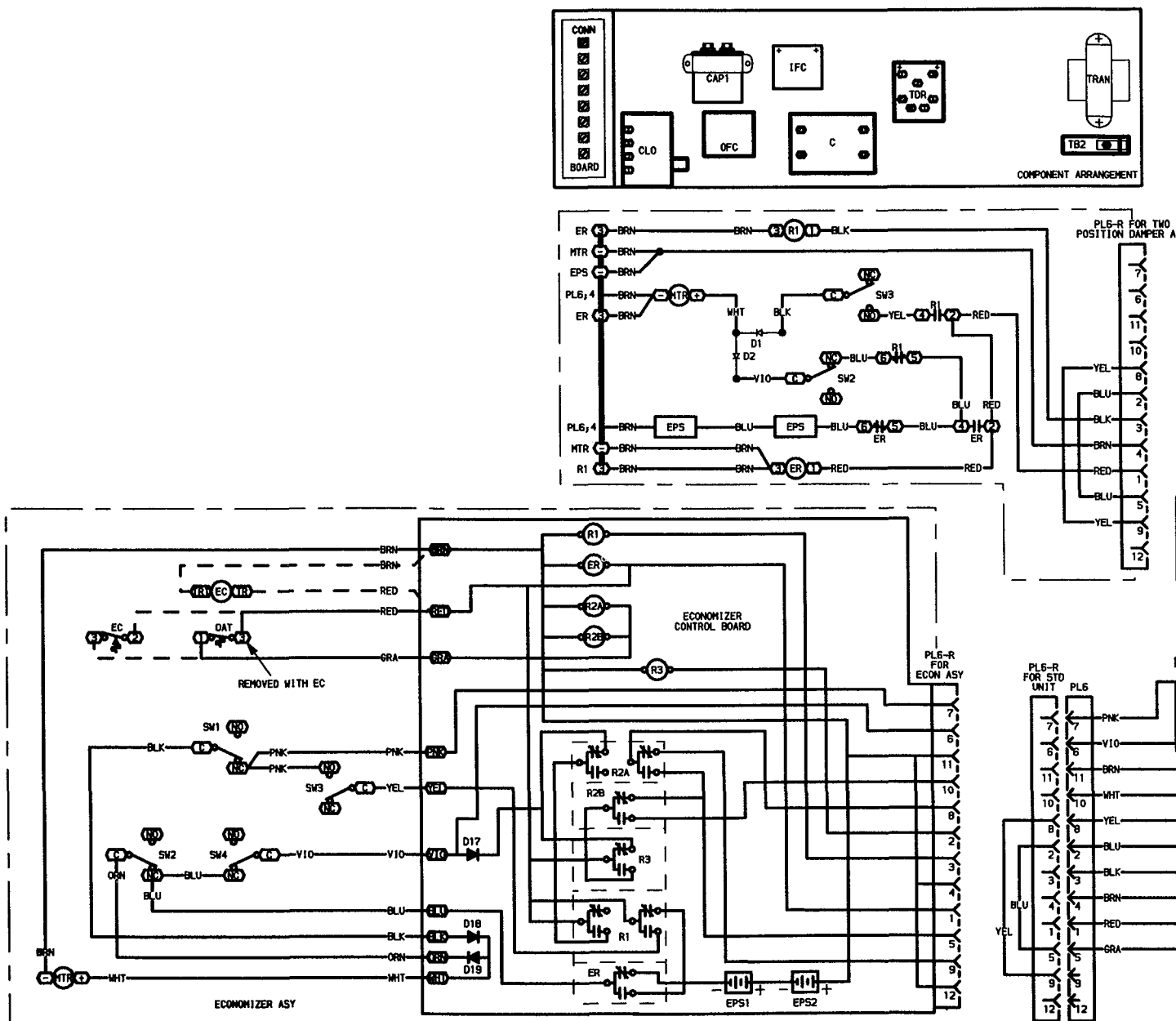


Fig. 14 - Label Diagram, Schematic and Com

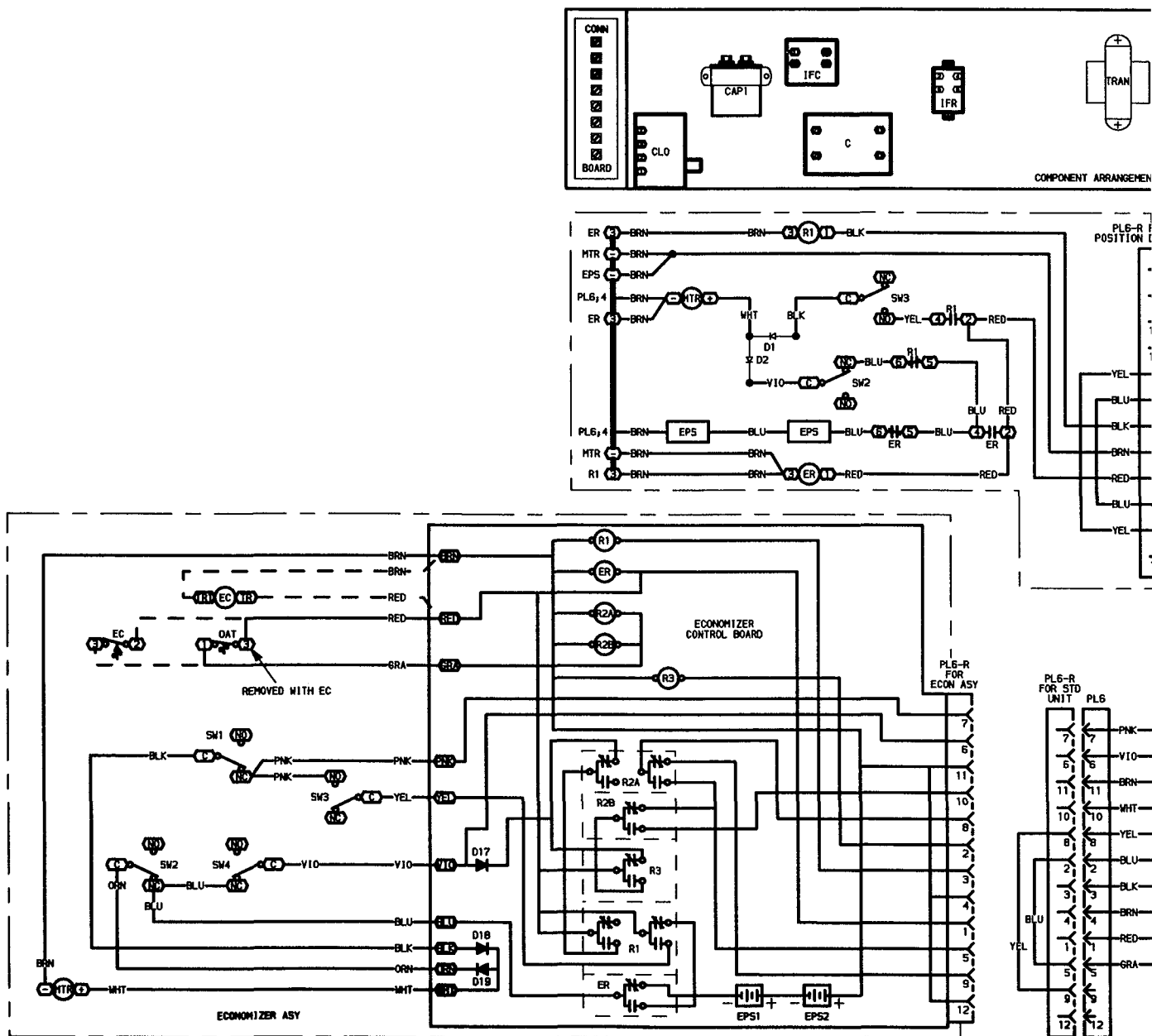


Fig. 15 — Label Diagram, Schematic and Component Arrangement



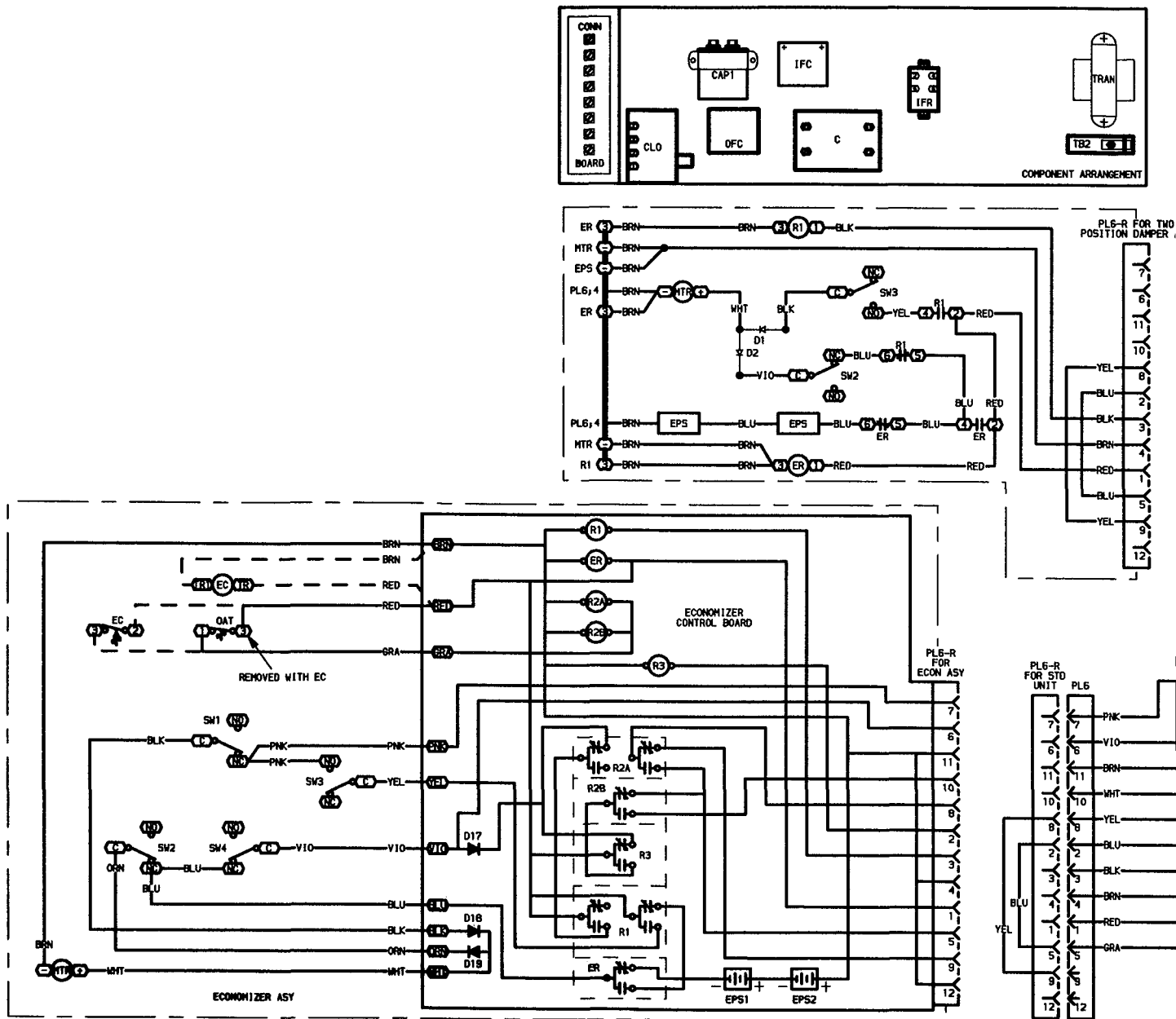
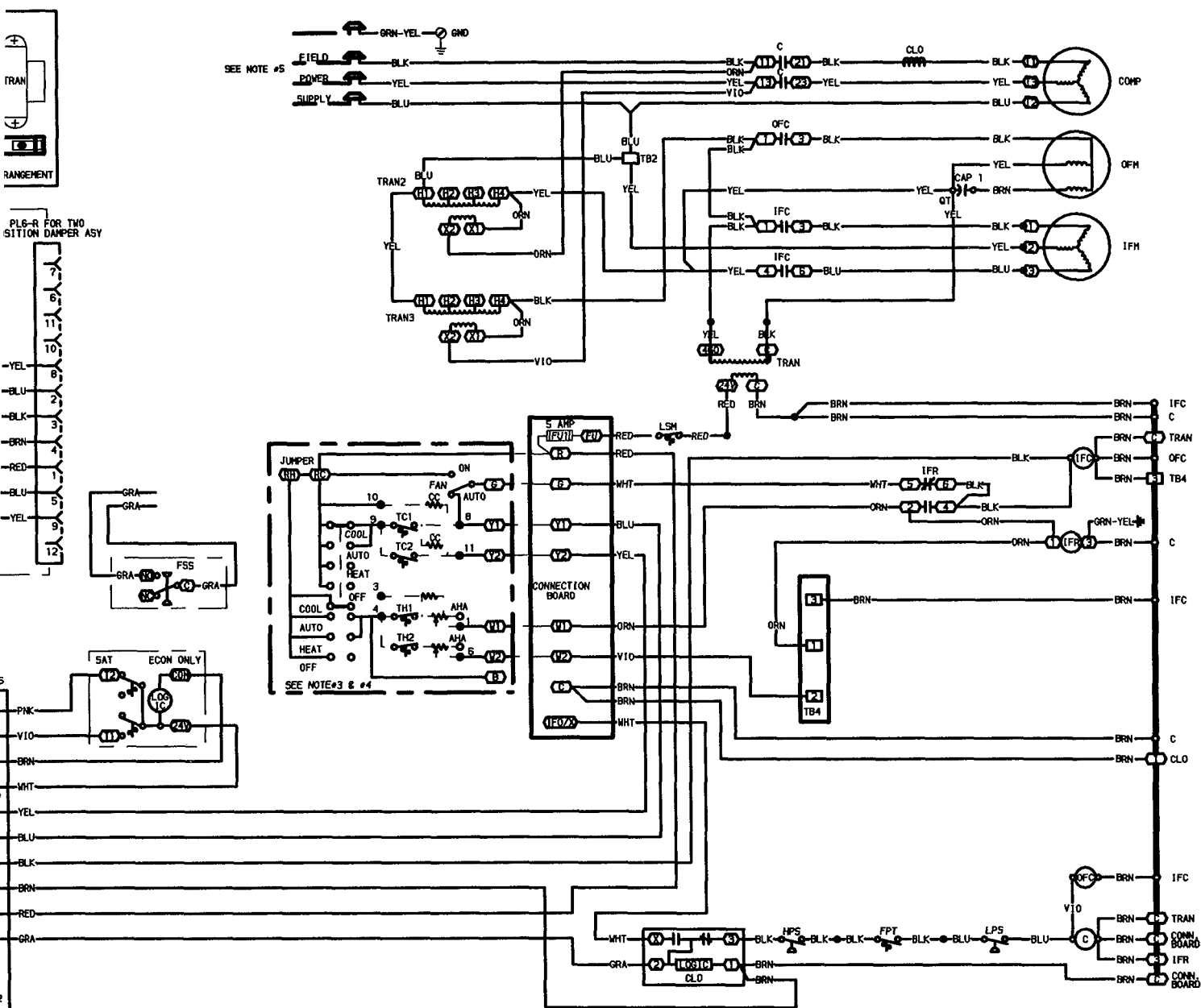


Fig. 16 – Label Diagram, Schematic and Com



and Component Arrangement; 50HJ007; 575-3-60

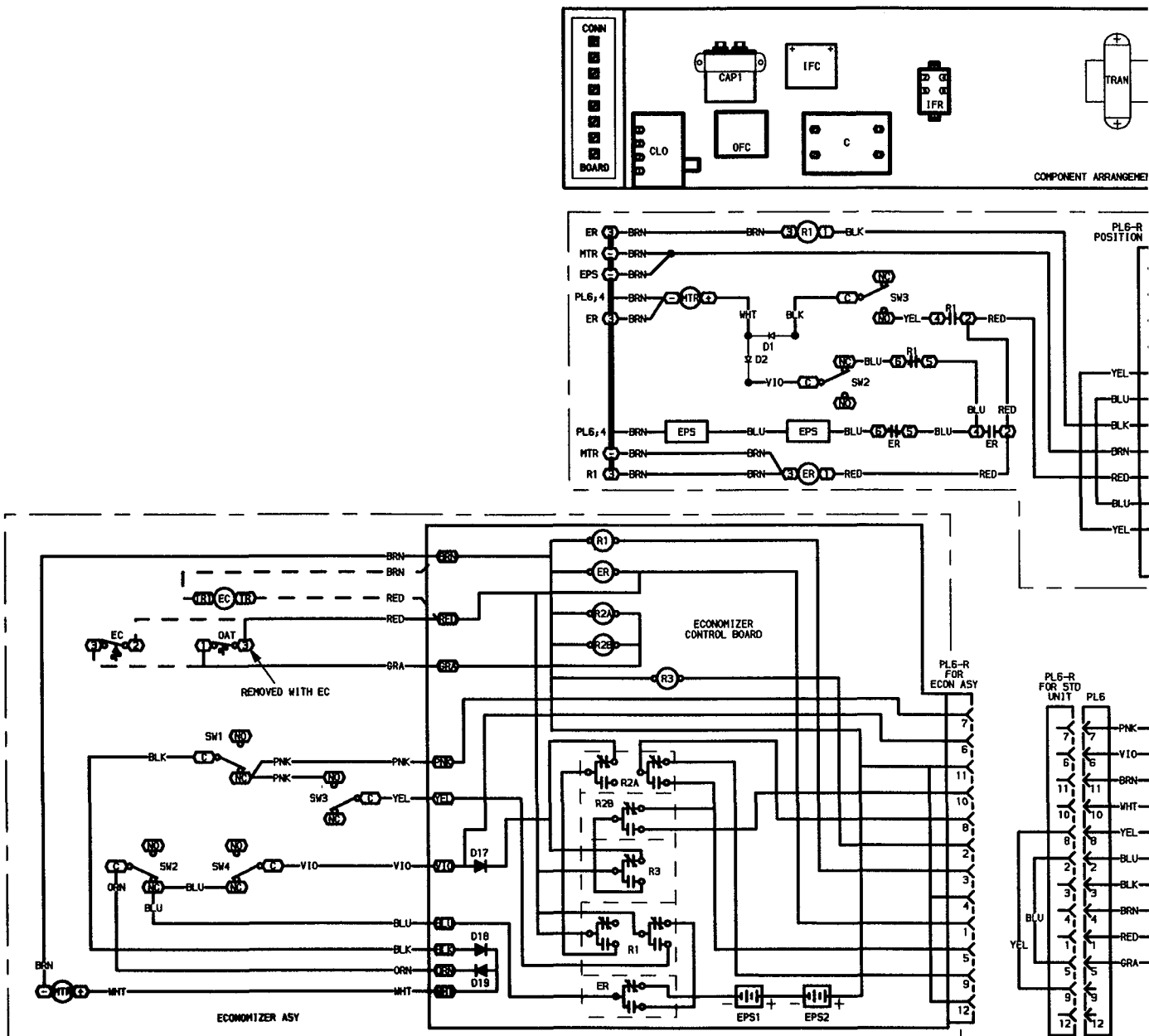
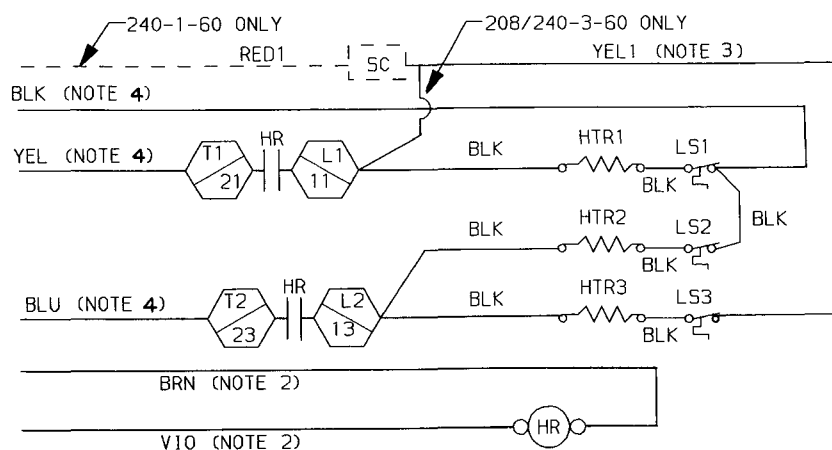


Fig. 17 – Label Diagram, Schematic and Cor



SCHEMATIC DIAGRAM



⚠ WARNING

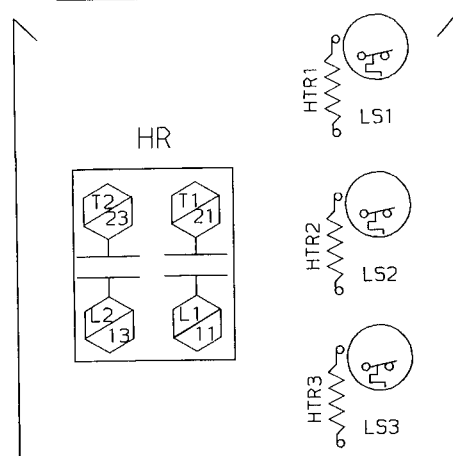
Electric shock hazard —
Disconnect all branch circuits before removing this cover.

NOTES:

1. To be wired in accordance with NEC and local codes.
2. BRN and VIO 24-vac wires are supplied with heater and connected at installation to base unit as shown on base unit wiring diagram.
3. For single phase, disconnect YEL1 wire from terminal L1/11 and connect RED1 wire and splice connector to loose terminal on YEL1 as shown above.
4. Power wires are supplied with heater and connected at installation to base unit field power connection box as shown on base unit wiring diagram. For field installation of electric heaters, field power connection box shown on equipment nameplate must be used.

Fig. 18 — Label Diagram Accessory Electric Heater; 208/240 V, Single-Phase (Units 50HJ004-006) and 208/240 V, 3-Phase (Units 50HJ004-007)

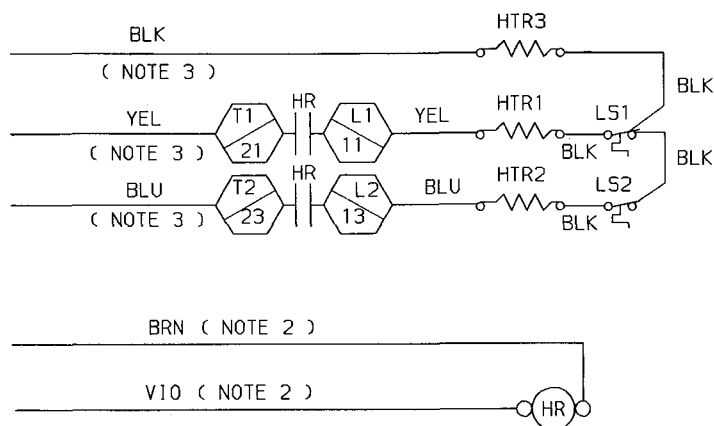
COMPONENT ARRANGEMENT



LEGEND

- HTR — Heater
- HR — Heater Relay
- LS — Limit Switch
- NEC — National Electrical Code
- SC — Splice Connector
- — — — — Field Control Wiring
- — Unmarked Terminal
- ⬢ — Sylvania Marked Terminal
- ⬢ — Elmwood

SCHEMATIC DIAGRAM



⚠ WARNING

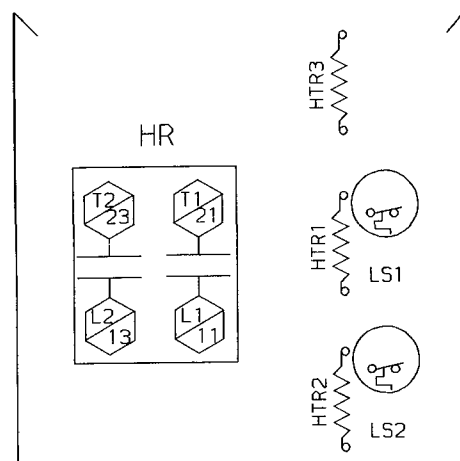
Electric shock hazard —
Disconnect all branch circuits before removing this cover.

NOTES:

1. To be wired in accordance with NEC and local codes.
2. BRN and VIO 24-vac wires are supplied with heater and connected at installation to base unit as shown on base unit wiring diagram.
3. Power wires are supplied with heater and connected at installation to base unit field power connection as shown on base unit wiring diagram. For field installation of electric heaters, field power connection box shown on equipment nameplate must be used.

Fig. 19 — Label Diagram Accessory Electric Heater; 480 V, 3-Phase (Units 50HJ004-007)

COMPONENT ARRANGEMENT



LEGEND

- HTR — Heater
- HR — Heater Relay
- LS — Limit Switch
- NEC — National Electrical Code
- — — — — Field Control Wiring
- — Unmarked Terminal
- ⬢ — Sylvania Marked Terminal
- ⬢ — Elmwood

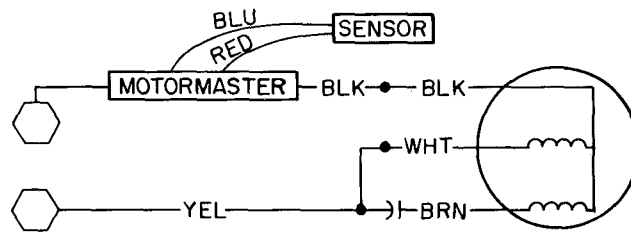
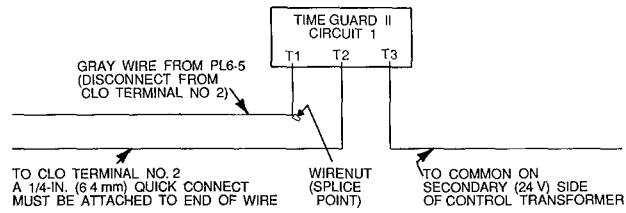


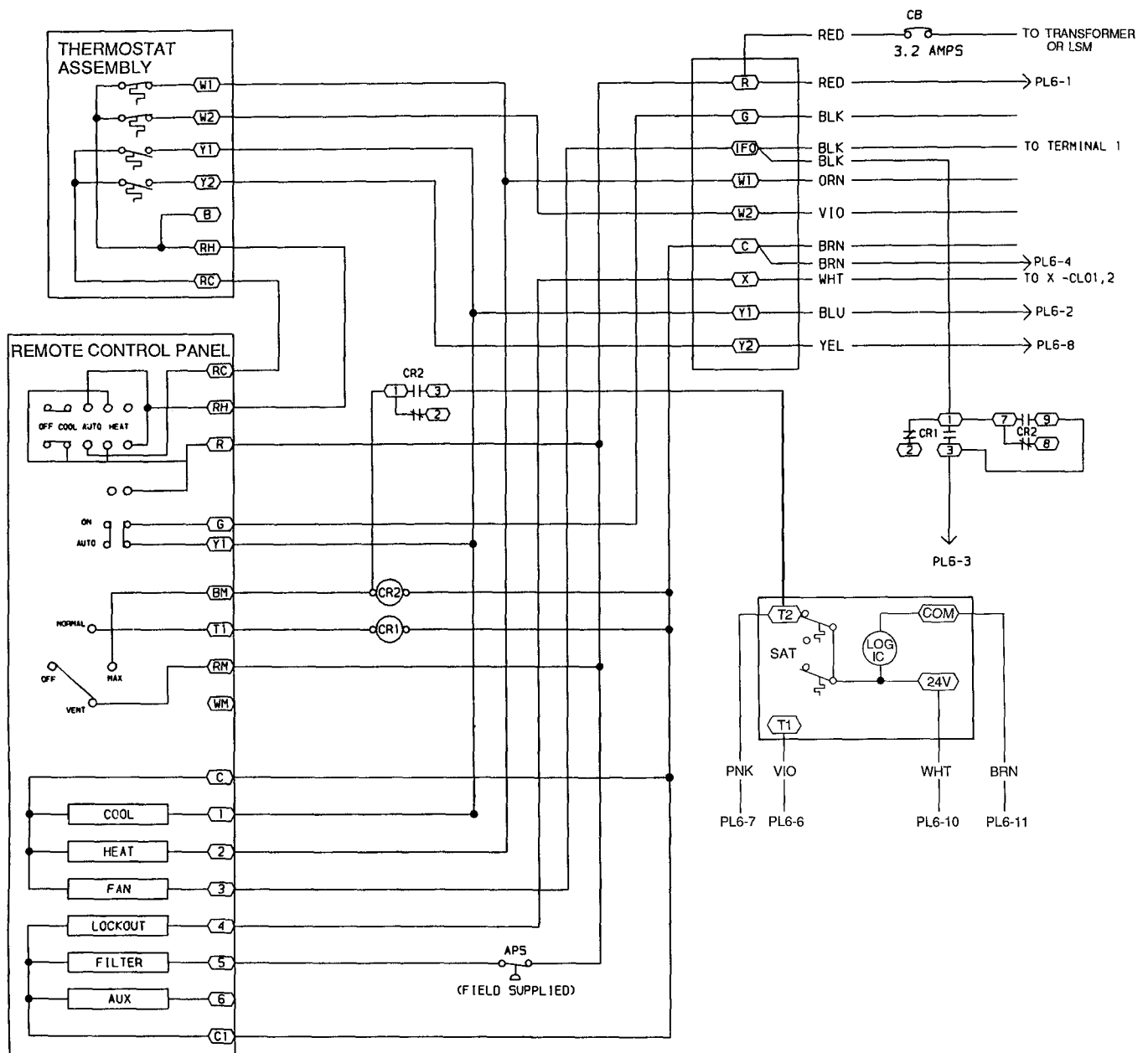
Fig. 20 – Motormaster® Device Wiring



LEGEND

- CLO** – Compressor Lockout
- PL** – Plug
- T** – Terminal

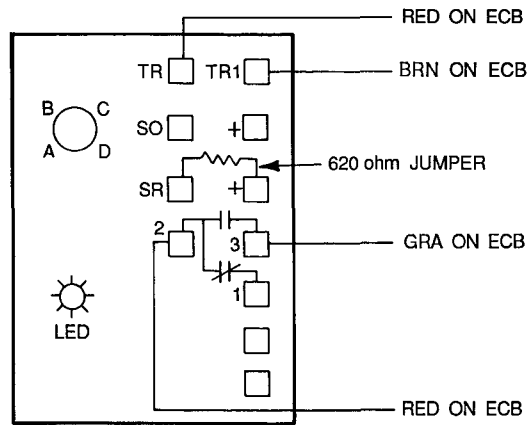
Fig. 21 – Time Guard® II Control Wiring



LEGEND

APS — Air Pressure Switch	CR — Control Relay (48HJ only)
CB — Circuit Breaker	LSM — Limit Switch (Manual Reset)
CLO — Compressor Lockout	PL — Plug
COM — Common	SAT — Supply-Air Thermostat

Fig. 22 — Remote Control Panel Wiring

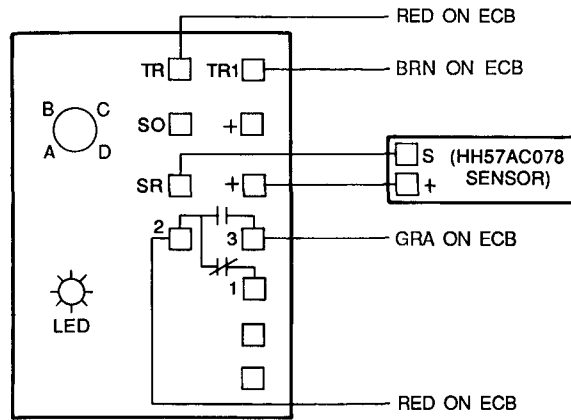


LEGEND

ECB — Economizer (Varislide™) Control Board
LED — Light-Emitting Diode

NOTE: Switches shown in high enthalpy state. Terminals 2 and 3 close on enthalpy decrease.

**Fig. 23 — Accusensor™ II Enthalpy Control
(Part No. HH57AC077) Wiring**



LEGEND

ECB — Economizer (Varislide™) Control Board
LED — Light-Emitting Diode

NOTES:

1. Remove factory-installed 620-ohm jumper across SR and + before connecting wires from HH57AC078 sensor.
2. Switches are shown in high outdoor-air enthalpy state. Terminals 2 and 3 close on low outdoor-air enthalpy relative to indoor-air enthalpy

**Fig. 24 — Accusensor™ III Enthalpy Control
(Part No. HH57AC077 and HH57AC078) Wiring**

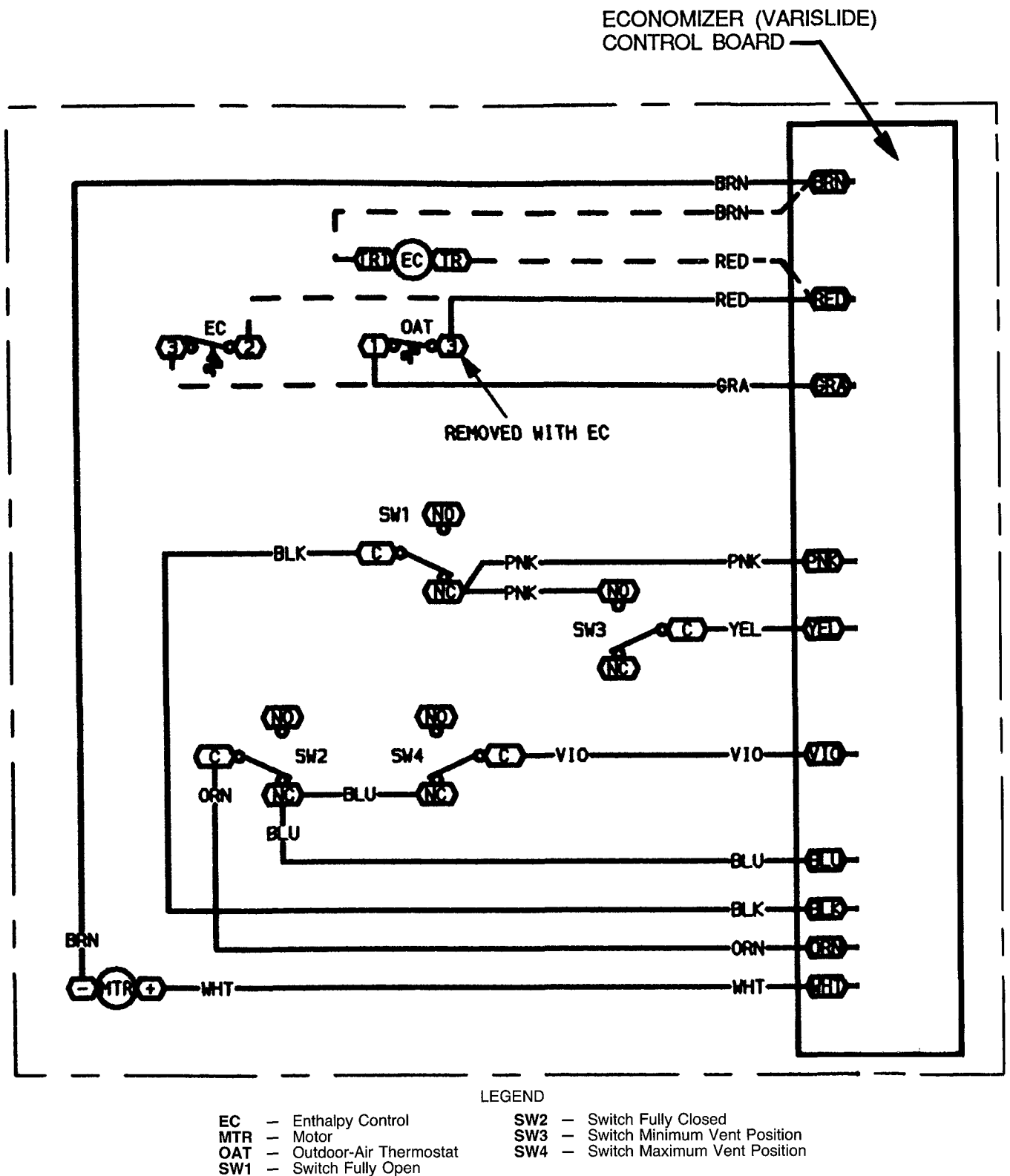
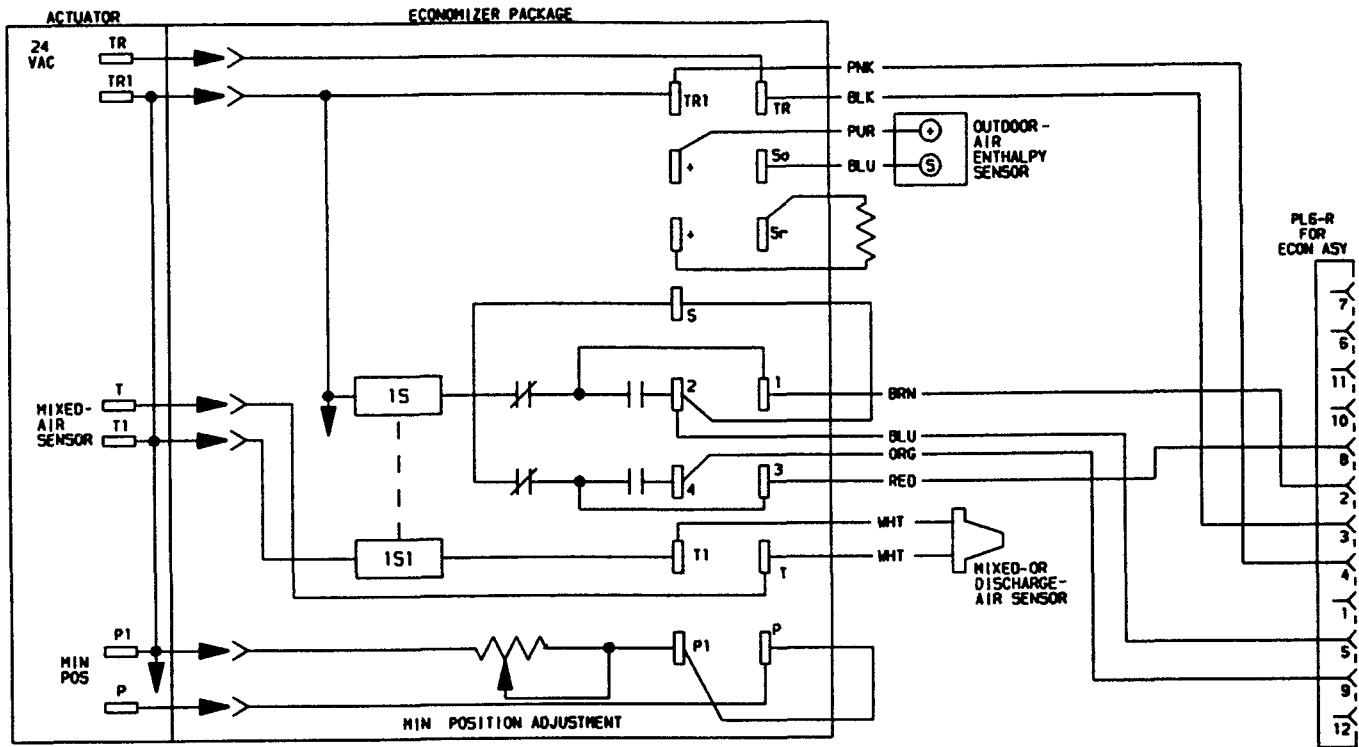


Fig. 25 — Enthalpy Control and Varislide™ Economizer Control Board Wiring



LEGEND

ECON	— Economizer	S	— Switch, Sensor
MIN	— Minimum	S _o	— Sensor, Outdoor
P	— Position	S _r	— Sensor, Return
PL	— Plug	TR	— Transformer
POS	— Position		

Fig. 26 — PARABLADE Economizer Wiring

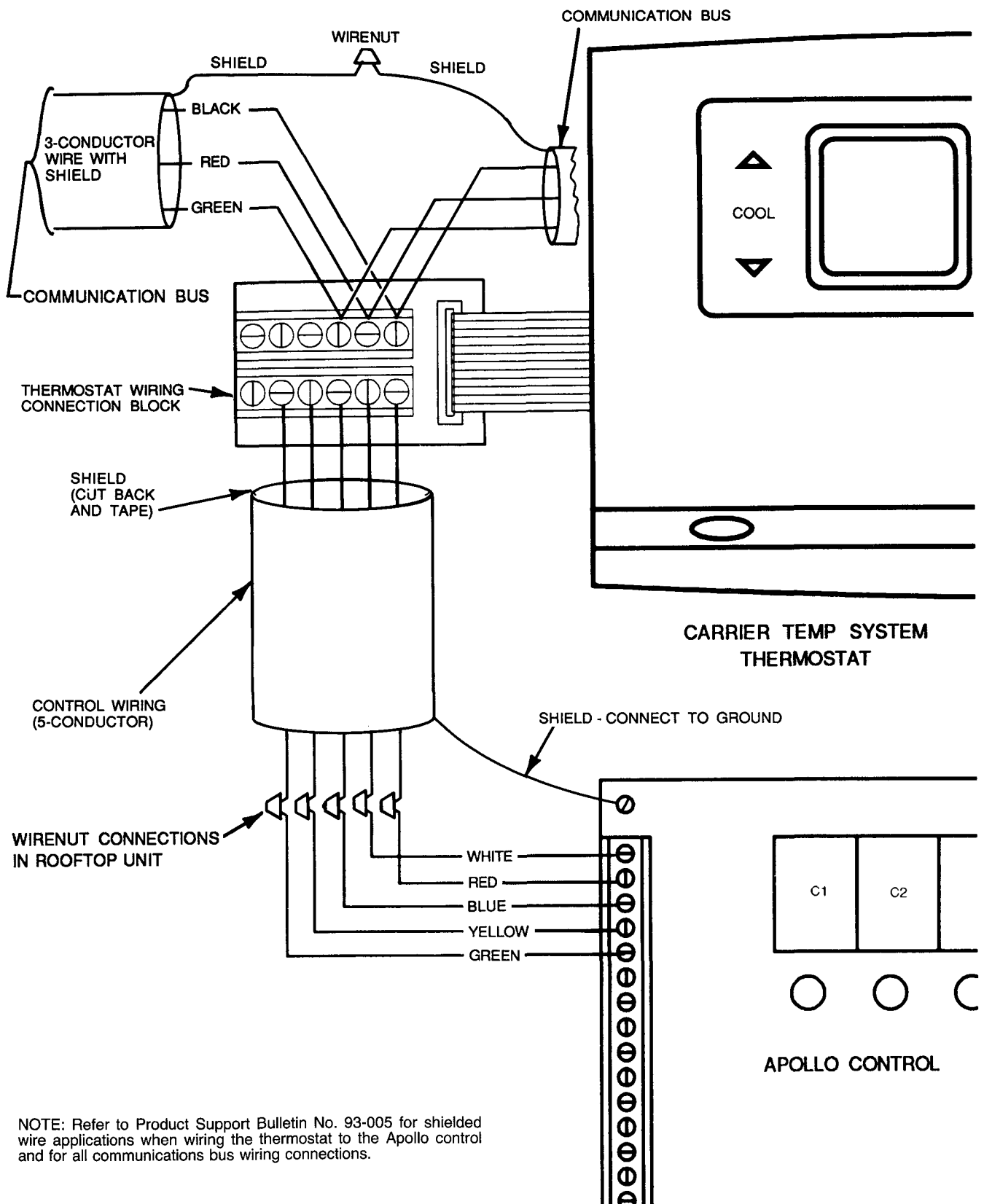


Fig. 27 — Carrier TEMP System Thermostat and Apollo Communicating Control Wiring

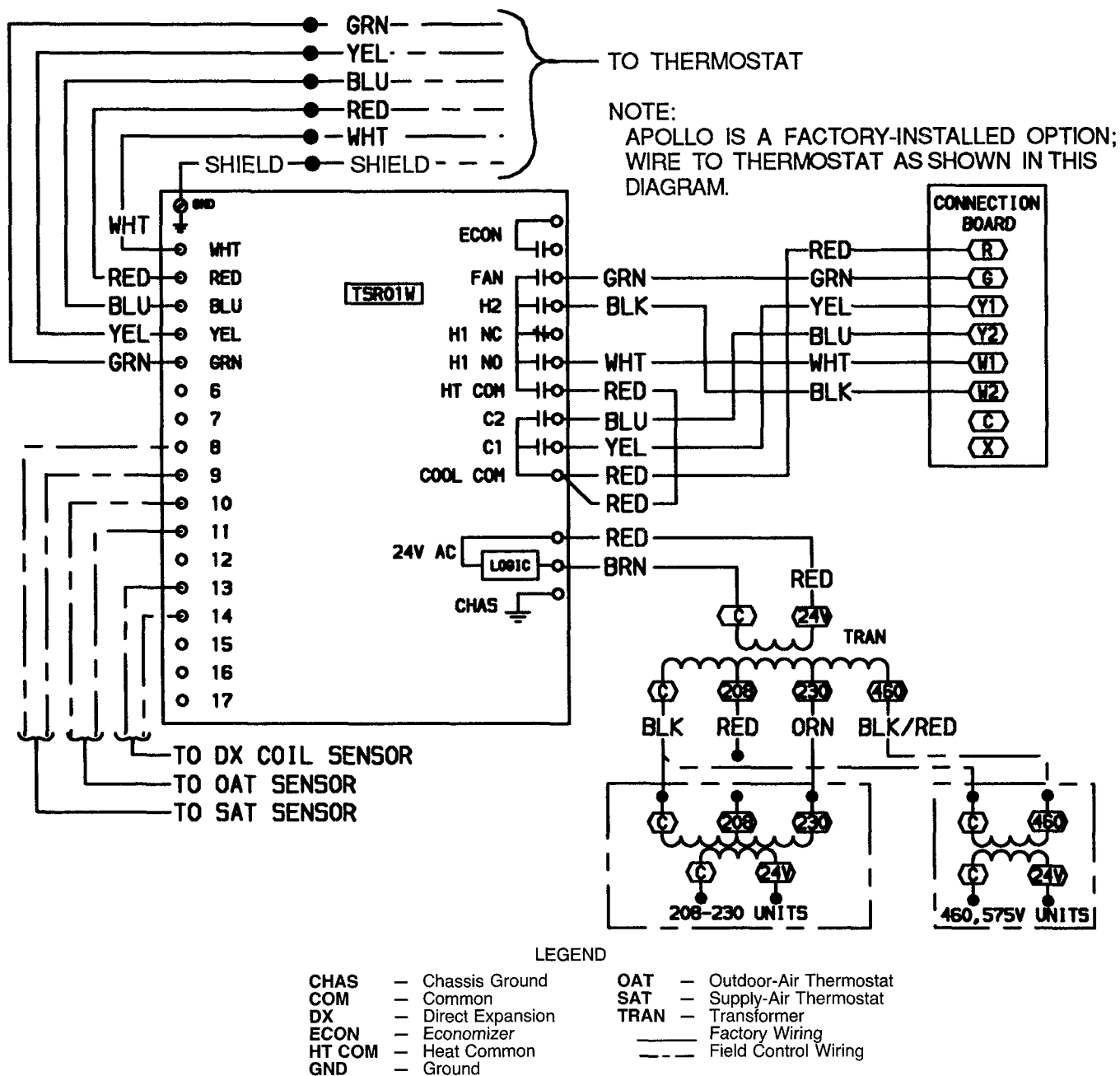


Fig. 28 — Apollo Communicating Control Wiring